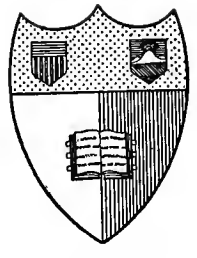

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CONTRIBUTIONES AD FLORAM ASIAE INTERIORIS PERTINENTES
EDIDIT HENRIK PRINTZ
III

THE VEGETATION
OF
THE SIBERIAN-MONGOLIAN FRONTIERS

(THE SAYANSK REGION)

BY

HENRIK PRINTZ

PUBLISHED BY DET KONGELIGE NORSKE VIDENSKABERS SELSKAB

THE VEGETATION
OF
THE SIBERIAN-MONGOLIAN FRONTIERS

Of the present series

CONTRIBUTIONES AD FLORAM ASIAE INTERIORIS PERTINENTES

EDIDIT *HENRIK PRINTZ*

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Preface.

In the present publication, vol. III of the series *Contributiones Ad Floram Asiae Interioris Pertinentes,* is given an account of the vascular plants I collected and observed on my journey in the summer of 1914 in southern Siberia and north-western Mongolia, in the so-called Urjankai country, a tract of land about the sources of the Yenisei, as yet almost entirely unknown.

As to the travelling route of the expedition, the nature of the field of operations and our journey on the whole, ØRJAN OLSEN has given a detailed account in his book, *Til Jeniseis Kilder, Den norske Sibirie-ekspeditions Reise 1914* (Christiania 1915). I have, moreover, in a previous work, *Die Chlorophyceen des Südlichen Sibiriens und des Urjankailandes,* the first publication of the botanical results of the expedition, also given a brief summary of our journey.

The original plan of the expedition of exploring only in southern Siberia, was somewhat altered, owing to a work published some months before our departure by DOUGLAS CARRUTHERS, the English geographer. In this work, which was entitled *Unknown Mongolia* (London 1914), the author, without entering into further details, relates of a strange tribe of Soyote reindeer-nomads he had met with in the isolated wooded regions near the sources of the Yenisei, being till then practically quite unknown. On account of this sensational information, it was agreed, at the last moment, that the expedition should also try to penetrate, if possible, to this interesting race for the purpose of procuring further particulars.

Consequently, the expedition came to traverse one of the regions in every respect least known in the interior of Asia, an out-of-the-way, isolated country, quite hidden by the impassable, wild Sayansk mountains and the waste mountain steppes of Mongolia, where the natives of the country have been able to preserve their original stamp, leading this very day a primitive life, altogether uninfluenced by any foreign culture. CARRUTHERS expresses himself in the following way about this country: «This birthplace of one of Asia's greatest rivers, the region of the sources of the Yenisei, has hitherto escaped the discerning eye and eager foot of the traveller. The existing maps of this country are much at fault, certain have never even been mapped, and no attempt has been made to describe the wild stretches of dense forest and rugged ranges on the Siberian-Mongol frontier, or the strange tribes of shy, forest-dwelling Urjankhai inhabiting them.»

It may be useful, in view of the localities mentioned later on and the following general survey of the character of the vegetation, to give in the sequel a brief account of the travelling route of the expedition. On the annexed map (2), only to be regarded as a rough and very imperfect sketch, the route is marked out by a red line. This sketch has been drawn from a Russian map in all essentials based only upon the statements of the natives. This country being mostly uninhabited and unknown, there are only few geographical names to which the local designations are referable.

The four Norwegian members of the expedition, at the begining of May 1914, proceeded by the Siberian railway to Krasnoyarsk, on the Yenisei, and further on up the river in a ferry-boat about 500 wersts southwards, to the small town of Minusinsk, where we arrived on the 29th of May. Minusinsk, the outpost of civilization in those regions, where the last post-office and the last telegraph station are to be found, became the real starting-point of the expedition. At that time of the year, however, it was quite impossible to advance further southwards owing to the masses of snow in the Sayansk mountains, and the immense areas of swamp formed during the melting-time in the subalpine virgin forests in the lower ranges of those mountains, utterly prevented any attempt to penetrate into these desolate, uninhabited and pathless wooded regions. During the first month, while we were waiting for the Sayansk range growing passable after the spring thaw, we made an excursion into the steppes along the river Ábakan, one of the largest tributaries of the Yenisei in those regions. We started from Minusinsk on June 2nd in a couple of canoes, in which we had packed up what was needed for the journey, the rest of our luggage being left behind. In order to lighten the transport, we intended to stick to the rivers and undertake from these shorter and longer lateral excursions into the steppes.

According to our programme we were carried down the Yenisei as far as the small village of Ust Abakansk[1], near the junction of the Abakan with the Yenisei, from where we meant to make our way further to the south, upwards along the river. Our original plan, to row up the river against the stream, had to be abandoned, as the river was found to be swollen by the melting snows in the mountains, making it nearly impossible for us to master the rapid current. To save time we determined rather to have our boats and luggage driven up the large, flat steppes surrounding the river, and then to set them afloat again at a convenient place higher up. After driving in this way about 120 wersts southwards from Ust Abakansk, we set the boats afloat again in the neighbourhood of the Abakan-Tartarian establishment of Askys, and were from there carried back down-stream. We encamped for some length of time on some of the numerous islets in the river, from where excursions were made over the steppes for botanical, zoological, geological, archæological and anthropological purposes. On this journey we passed the rivers Kamuishto and Uzuik, tributaries of the Abakan, and were, as planned, back again at Minusinsk on the lst of July. During a short

[1] ust (Russian) = mouth.

stay there, we made excursions into the neighbourhood of the town, for instance to Buistraya and the salt lake Tagarski osero[1], and then left Minusinsk to set out on our way to the south-east into the Urjankai country. During the first days the route lay as shown on the map, direct eastwards through a hilly steppe-land, leading past the villages of Taskina and Karatus to Kushabar, the last settlement in these parts. Here, the rich, open plain-lands of Siberia come to an end, and before us extended immense areas of primeval forest. A kind of path or route rather indistinctly marked out leads from the said village through the Sayansk range into Mongolia, only rarely availed of by some lonely fur-trader or by gold-diggers from the mines among the mountains. This route, however, being very difficult, and at any rate impracticable with heavily loaded pack-horses, which would make us run great risks and waste time, we hired at Kushabar a number of boatmen, who poled our luggage in flat-bottomed canoes southwards up the Amyl River. While a couple of the members of the expedition had to join the boatmen to look after the luggage, the rest set off on horseback through the «Taiga», accompanied by some guides. As a botanist, wishing to study the vegetation and the forest more closely, I chose to join the latter party. The Amyl River is passable in canoes about 120 wersts southwards up to Kalna, a lonely Russian settlement on the Upper Amyl. Here both parties met again, and from here all our luggage was carried by pack-horses through the Algiac Pass, forming the boundary between Siberia and Mongolia. Here we left Russian territory, and passed over into Chinese Mongolia, and on the 20th of July we arrived at Ust Algiac, on the south side of the Sayansk mountains. Ust Algiac is situated on the river Sisti-kem[2], a tributary of the Bei-kem. From Ust Algiac, serving as our headquarters, we made shorter and longer excursions into the surrounding country, for instance to a Soyote camp on the river Tshernoretska, and to a snowy mountain, to the north, where we had an opportunity to study the alpine flora and fauna and make collections. In a sketch in the above-mentioned book by CARRUTHERS, these mountains are only reported as «White Mountains». According to the designation of the natives, I have, in the following, applied the name of «Altaian» to this mountain mass. After more than a fortnight's stay in this rather rainy tract, we floated with our luggage on the 5th of August down the Sisti-kem in a raft made for the purpose, as our collections had added to the impediments, and arrived at Ust Sisti-kem on the Bei-kem in the evening the 9th of August.

After making several excursions from here, we left most of our luggage behind and travelled further on southwards past Ust Kamsara, Saimka Lobanowa, and the river Ii to Kokus and Safianow on Ust Dora-kem, and right south to the centre of the Soyotes on the Dorasteppe, near Todshi-kul,[3] the sacred lake of the Soyotes. After about a week's stay here, during which we also visited the

[1] osero (Russian) = lake.
[2] Kem is a Soyote word, meaning river; Sisti is also a Soyote word, meaning small in contradistinction from bei = large. Bei-kem — the large river — is the name given to the Yenisei by the natives.
[3] Kul is a Soyote word, meaning lake.

Buddhistic temple «K u r e e» in this place, we descended on the 21st of August, in two canoes, the Bei-kem, running here at an average rate of 16 wersts an hour. At Ust Sisti-kem we took along with us the luggage left there, and floated down the river. At the rapids, the so-called p o r o g s, formed by the river near U t i n s k i, we had to disembark all our luggage and carry it downwards on the banks along the river, the boats being towed down-stream, or here and there, where the rapids were too powerful, dragged over land. Under such circumstances the day's journeys became rather short, not exceeding from ½ to 1 werst, but for the rest, this boat expedition on the rapid stream was very quick, our day's journeys varying from 100 to 150 wersts. Here and there on our way, in favourable situations, we made shorter stays to make collections. We passed on this journey the rivers S e b i, U t t, U j u k, T a p s a, and C h u a - k e m or C h a - k e m. After the junction with the last-mentioned stream at B j e l o s a r s k, the river runs under the name of the U l u - k e m through a rugged mountain steppe about 300 wersts westwards to C h a - k u l. The small village of Cha-kul, where we arrived on September 2nd, is the extreme station of the caravans coming through Mongolia, whence the Chinese and Mongolian goods are conveyed down the stream on immense rafts to Minusinsk and Krasnoyarsk. From merchants who happened to pass the place, we learnt of the European conflict having broken out during our stay in the large wooded regions about the sources of the Yenisei. The river further on downwards was difficult or even dangerous to pass in our small canoes, large and swift as it had grown, with many rapids. As a large raft loaded with Mongolian bales of wool was just to start on its way northwards on the following day, we therefore determined to take this opportunity. At K e m c h i k - b o m[1] the river runs through narrow clefts with high, vertical, rocky walls on either side, at the furious rate of about 40 wersts an hour, forming shining and whirling rapids, which it would have been most dangerous to attempt to pass in our small boats. In these clefts the boundary between Mongolia and Siberia was passed, and eventually we arrived at Minusinsk again towards the middle of September. An autumn excursion we had intended to make into the steppes in the adjoining district of the town, had to be given up owing to difficulties caused by the great war.

It appears from the above survey and the following account that, our travelling route being so long and the regions traversed so untrodden, we had to force the journey to the utmost in order to be able to finish it in due time. In this way the journey itself took an excessively long time, and only few spare days I could wholly use for botanical investigations. On a journey of this kind there was, as a matter of course, no opportunity whatever for plant-oecological or statistical researches. Accordingly, the information I am able to give in the following chapter concerning the general character of the vegetation in the tracts traversed, only make pretence to be a general phytogeographic survey. The journey was also mostly undertaken in boats or rafts on the rivers, and only during the short intervals for meals on the banks, could

[1] bom = pass.

any botanizing be pursued. On the journeys over land we were generally on the move from sunrise till nightfall, and the caravans advancing quickly, a botanist would soon have been left behind if he had attempted to gather other plants than those growing quite near the route. Nor was it advisable to be left too far behind, as a straggler in many cases might easily lose his way, straying into one of the many paths made by wandering wild beasts in the process of time. The traveller is also as a rule under the necessity of following these paths on a journey through this country. The plants which might be collected in this way in the course of the day, had to be subjected to pressure, and shifted into dry paper in the evening, in a narrow tent only sparingly lighted up by means of a tallow-candle. Especially in the higher and moister regions it was often rather difficult to get the sheets of paper dried, and preserve the plants already prepared, in spite of careful packing in canvas bags.

A foreign botanist may also meet with unlooked for difficulties here on the part of the natives. According to their superstition the earth is sacred, and any digging in it is considered to be a great sin, and such a violation is therefore very severely punished. This circumstance may also possibly account for the fact that they do not bury their dead in the ground. Accordingly, a short time after my arrival, the natives began to look upon my botanical undertakings with suspicion. Knowing nothing about this, I used every now and then my long Russian knife for rooting out plants in the presence of the whole tribe. It was therefore no wonder that the natives got excited, and for the bad weather and other calamities occurring just at that time, I was held responsible, In spite of their respect for ourselves and our weapons, I was finally, when at last my misdoing had passed beyond all bounds to such an extent that I had not even shrunk from violating one of their holy plants, in a very defiant manner, summoned before the great chief of the tribe — the «Nojon» — and requested for an explanation. At the same time the great old shaman of the place threatened to let loose against us all the evil spirits, if we were not willing to apologize at once and do everything in our power to reconcile the great spirits. Under these circumstances it would have been unadvisable to stir up the public opinion any longer, the more so one of the chief objects of our expedition also being to procure ethnographical material and information concerning this interesting race, for which reason it was necessary to gain their confidence. There was accordinly no alternative but making amends for my crime, promising to adopt a better line of conduct for the future. After this adventure there was some difficulty for me to make my appearance with my disreputable botanical case, and when undertaking botanical excursions later on, I had to steal out secretly, and gather plants in my pockets, in paper bags, telescope cases, etc. We were also several times afterwards followed by natives, who had evidently been charged by their dignitaries to watch our conduct. Other travellers in central Asia also tell of having been escorted in a similar way by the natives.

As a matter of course it is out of the question to give here an exhaustive botanical survey, and only a contribution to the knowledge of the vegetation of these regions is

aimed at, of which the existing literature hitherto contains only so little. It appears from what follows that the flora here, except the drier and hotter steppes, has an arctic, subartic and boreal character, bearing in its main features a close and interesting resemblance to the flora of northern Europe. The resemblance was really frequently so striking, above all in the hydrophytic plant-associations, that a Scandinavian botanist might wonder at being in quite another part of the world. The vegetation here consists, in a great measure, or even mostly, of the same species as in Scandinavia or of types very near the European ones in systematical respects. Above all, it is the flora of northern Scandinavia with which the vegetation of these regions seems to agree. It might have been interesting, in the present paper, to enter into the question concerning the connection between the flora of central Asia and that of Scandinavia, at a greater length, taking into account the relations of land and sea, the migrations of the plants, etc, immediately after the last glacial period. This, however, I will have to postpone until new and more complete observations have been made by me during another journey to these regions, which I hope to be able to undertake according to my plan.

It appears from the exact examination I have made of the Asiatic species that at times they differ slightly from the corresponding Scandinavian ones, the species occurring here — as it seems — frequently in other geographical races. It is, however, often impossible to determine exactly the systematical value of these small variations, which are in part only of a relative character, on the basis of a material so scarce and so accidentally brought together as must needs be the case in expeditions of this kind. In order to be able to arrive at trustworthy results concerning this question, a very close study is required, based upon a far richer material than the one I have had at my disposal. In order not to confuse any more the systematical nomenclature, I have therefore — as long as I have not settled the systematical value of the aberrations —chosen not to describe new types founded on these dubious characters. Only in cases of real difference in point of organization, of undoubtedly genotypical nature, have I found it right to distinguish the form in question as a new systematical type. The systematical value of these characters may perhaps also be viewed in a different way by future researches based upon a richer material, but in cases where the Asiatic forms are closely connected with well defined species, with which they have hitherto been united or confounded, I have generally thought it right to refer the forms only as new varieties or subspecies of these ones. The Asiatic specimens also sometimes seemed to be intermediate between types distinctly separated in Scandinavia. Especially in modern genera, rather rich in species, it is often difficult to decide whether a specimen ought to be referred to one or to another of two nearly related species, which are from the first created only upon European material, since the specimens in question appear to combine characters from both of them.

Unfortunately, the collections of the expedition have not yet all arrived, among which there is also likely to be found some botanical material that is missing, consisting of a number of vascular plants as well as of mosses and lichens

from the Urjankai country. Owing to the extraordinary state of affairs in the autumn of 1914, we were unable to bring our collections home, but had to leave them in various places in Siberia. Most of these articles have arrived afterwards via the Arctic Ocean, across the mouth of the Yenisei, in ships belonging to the Norwegian-Siberian Trading Company, but some are still missing. All inquiries have, of course, under the present circumstances, been quite in vain, and not knowing what has become of the collections, I have thought it right not to put off any longer the publication of this paper.

As to previous investigations of the vegetation of these regions, I refer to the complete list of literature inserted at the end of this paper, also comprising all works on the adjacent regions and the whole Yenisei valley, right up to the Arctic Sea. A survey of the literature only concerning the territory traversed would not be very extensive, these regions being some of the least known of central Asia. The region about Minusinsk is the one best known, and has especially been explored by MARTJANOW. The Urjankai country, on the other hand, has remained, to the very last, a real *terra incognita*, not only in point of botany, but also in every other respect. The meagre botanical information of this country is to be found in works by KRYLOW (1903), SCHISCHKIN (1909), as well as by PRICE and SIMPSON (1913).

All that is put down in the following pages, I have collected and observed myself on my journey in 1914, and all of the photographs and other illustrations are likewise original. I have, in the following, annexed a series of photographs, as these are rather instructive, and likely to convey a good idea of the general character of the country.

Nearly all the determinations have been undertaken by myself, partly here at Trondhjem, partly during stays at the Botanical Museum of the Christiania University, and during a stay in Petrograd in the summer and autumn of 1916, with a grant from the University at Christiania. In Petrograd I had the opportunity of examining the rich botanical collections from Siberia in the herbarium of the Imperial Botanical Gardens of Peter the Great, and in the Imperial Scientific Academy. A series of the authentic specimens of TURCZANINOW, REGEL, LEDEBOUR, MEYER and other explorers of Siberia, which are to be found here, have especially been of great interest to me. I am, moreover, also indebted to the Museum of Bergen and the Botanical Museum of the Scientific Academy at Stockholm for loan of material for comparison.

I have, however, occasionally been able to profit by the advice and suggestions of some specialists, such as in Petrograd: Professor Dr. W. KOMAROW, Professor Dr. B. FEDSCHENKO, Dr. R. ROSCHEWITZ, Dr N. SHIPSZINSKY and Dr. W. SUKATCZEW, to all of whom I tender my sincerest thanks. Moreover, I call to mind with especial thankfulness my friend Dr. IWAN NOWOPOKROWSKY for the kind assistance he rendered me at a time when so many difficulties were thrown in the way of foreigners in Petrograd, thus enabling me, under the existing condition of things, to profit richly by my stay there. During the subsequent composition of my manuscript here at Trondhjem, he has also been kind enough to lend me from his private library a series of very useful books, which are no more in the

market, and which I have also searched for in vain in all the Scandinavian public libraries.

Among Scandinavian botanists, who have kindly lent me assistance in different ways, for instance in the denomination of critical species, in procuring literature etc., I am glad to acknowledge my indebtedness to Rector L. M. NEUMANN, Docent Dr. GUNNAR SAMUELSSON, Dr. H. DAHLSTEDT, the Rev. S. E. ENANDER, Professor Dr. N. WILLE, Custos OVE DAHL, School-manager A. NOTØ, c.r. E. JØRGENSEN, and School-manager K. TRAAEN.

To Dr. B. LYSHOLM, Trondhjem, who has liberally defrayed the expense of the illustrating plates, I beg to return here my sincere thanks.

Trondhjem, January 16th 1919.

HENRIK PRINTZ.

General Phytogeographic Relations of the Regions Traversed.

The Abakan Region and Adjacent Steppe Areas.

The small town of Minusinsk, from where the expedition was started, is situated on the eastern bank of the Yenisei River, in about 92° east longitude, and 54° north latitude. The traveller approaching Minusinsk from the north by the river-ferry from Krasnoyarsk by the Siberian railway, will rather soon observe, in the general character of the vegetation, when going southwards, a gradually increasing dryness of the climate. The river-banks are at first rather steep and rocky, reaching from 100 to 150 m. above the surface of the water. The eastern river-side is markedly higher and steeper than the western, a strange fact, which may be accounted for by the rotation of the earth.

Fig. 1. View of the river Yenisei northwards. The bank on the right (east) side of the illustration markedly higher and steeper than on the left (west) side. Between Minusinsk and Krasnojarsk.

The steep and rocky slopes are more or less naked, most of the soil being carried away, and the vegetation here mostly consists of mosses and lichens. In places which are not too steep for the heaping up of earth, the declivities exhibit various conifers and foliage trees, especially *Betula verrucosa, Populus laurifolia, Populus nigra, Populus tremula, Prunus Padus,* several species of *Salix,* and *Rosa,* etc.

Of conifers occur *Abies sibirica, Picea obovata, Pinus silvestris,* more rarely *Larix sibirica* and *Pinus Cembra var. sibirica.* The eye of the traveller, however, is especially caught by the fine, white-stemmed birches with their fresh, green leaves, and — at this time, in the second half of May — by the flowering bird-cherries, filling the air with delicious, sweet odour. The trees here did not seem to attain any considerable height, being most of them comparatively small and medium-sized, recurved and crooked. Farther southwards the banks become gradually less steep and rocky. It appears from the luxuriant vegetation that the soil here is very fertile, but only here and there, at long intervals, are seen some few and small patches of cultivated ground, constituting only a minimal portion of the land. The very scattered population seemed, by the way, to live mostly by breeding of cattle, and every now and then the traveller passes herds of cattle, especially of cows, sheep, goats, and horses.

Further south the river becomes broader and shallower, here and there almost resembling a lake with numerous low islets; the valley widens, and the river-banks successively become lower. The traveller is now approaching the extensive south-Siberian steppes about Minusinsk; the climate becomes drier, and the wood gradually disappears. The cedar, spruce, and silver-fir, requiring much moisture, disappear first, then the fir, and last the larch, which seems most enabled to stand the drying wind prevalent in these tracts. Thus the character of the scenery is gradually changed from that of wooded country into a dry, open, brownish steppe, here and there with grey, reeking, and barren areas of sand, or with scattered larger and smaller salt lakes, some of which were already quite dried up, glittering in the sun. Along the river-banks and on the low islets are especially to be found several species of *Salix, Populus nigra* and *Prunus Padus,* with a luxuriant undergrowth. This luxuriant belt, however, is quite narrow, only covering the immediate neighbourhood of the river.

The environs of Minusinsk are, accordingly, a slightly undulating, open steppeland, from where the snow-clad peaks of the Sayansk mountains may be seen gleaming forth, limiting the steppe to the south. In the northern part of the Minusinsk region, the soil is generally sandy and too dry for farming, while, on the other hand, the southern parts mostly consist of of the well-known Russian black earth — «t s c h o r n a j a s e m l j a». Here the climate is moister and the country accordingly very rich. This southern and south-eastern district is really considered to be the richest and most luxuriant one in all Asiatic Russia, and is for this reason also named the Italy of Siberia. The towns along the Siberian railway are, for a great part, supplied with corn and other victuals from this region.

As compared with other parts of Siberia, the Minusinsk region has a very mild and pleasant climate, without the sudden transitions frequently so characteristic of the open Siberian steppes. It is, of course, markedly continental, with very hot summers and cold winters, in summer with hot days and rather cold nights. In June, a maximum temperature of the day of 40° C. was not unfrequently recorded by us, while the nights were, in return, comparatively cold, now and then with only some few degrees of heat — from 5 to 6° C. — and with an exceedingly heavy dew-fall. At that time of the year, the dew began to appear already before sunset, and was later in the evening so heavy as to resemble a fine rain dripping from the trees. This was often observed during our stay on the islets in the river Abakan. The rivers here are free from ice at the end of April or the beginning of May.

According to CARRUTHERS the mean annual temperature and rain-fall at Minusinsk are:

Winter: temperature ÷ 14,4° C. (January is the coldest month), amount of rain 15,2 mm.

Spring: temperature + 6,1° C., amount of rain 54,8 mm.

Summer: temperature + 19,4° C. (July is the hottest month), amount of rain 141,2 mm.

Autumn: temperature + 5,6° C., amount of rain 67 mm.

The most important quantity of rain is seen to fall in summer and in the autumn, amounting to 200 mm. or slightly more, while the snow-fall in winter is rather insignificant. Thus the total average rain-fall at Minusinsk is 278,2 mm., but varies rather much even in neighbouring localities. It increases rapidly southwards and eastwards, towards the Sayansk mountains, being nearly doubled, and reaching 538,5 mm. yearly, at a distance of only 68 wersts from Minusinsk. The character of the scenery is therefore rather suddenly changed, passing into a more rugged and richer tract of land, with a more luxuriant and varying vegetation, with various trees and shrubs. The most northern and western part of the Minusinsk Steppe, where the steppe-land predominates, is accordingly the driest.

Between the Yenisei to the east and the river Abakan to the west, there extends a large, flat, nearly barren and depopulated steppe, the so-called A b a k a n S t e p p e. As I have only traversed a rather small part of it myself, especially the portions about the river Abakan itself and the tracts of land west of it, I shall, in the following, only treat of these parts. It may be added that I have never visited the large steppes towards the Yenisei. The Abakan Steppe itself is certainly more arid than the surroundings of Minusinsk, but there is a total absence of observations as to the meteorological conditions of these regions nearly uninhabited. In this district, both the Yenisei and the Abakan are very broad, widening in places so as to form veritable small lakes with a great variety of rather low-lying islets, always exposed to the erosion of the current, so that the borders are generally steep. Frequently larger and smaller quantities of earth slide down when the river has dug out sufficiently to remove the support of the higher strata.

In the month of June these islets lay at a level of from 1 to 1,5 m. above the surface of the water, that is, on a level with the low steppe itself. To judge from all the drift wood, however, washed upon the islets, they are completely or partially submerged in spring when the river-water is at its highest. This circumstance may, moreover, account for the nearly total absence of quadrupeds and reptiles, especially snakes, abounding on the steppes, but never observed by us in these localities. Chiefly in the lower part of the river some of the islets lie at a considerably higher level, the whole steppe as well lying somewhat higher, frequently from 3 to 6 m. above the surface of the river. The stream constantly erodes this loose material on the sides, and the steppe, as well as frequently also the islets, generally rises abruptly from the water.

Fig. 2. From the lower course of the river Abakan. The river erodes, so that the steppe falls abrupt towards the river.

In the neighbourhood of the river the soil of the steppe chiefly consists of brown clay, at a greater distance from the river of black earth, and here and there of sand or very sandy earth. In many places the soil is saline, salt lakes and salt marshes being widely distributed. In places where the solid rock lies bare, it turns out to consist of red Devonian sandstone cliffs with scattered coal-fields. The steppe floor proper lies at an altitude of from 250 to 300 m. above sea-level, which is markedly low, making proper allowance for the fact that it is situated so far into the great continent.

There is now, practically speaking, a complete absence of tree vegetation in the traversed parts of the Abakan Steppe, save in the immediate neighbourhood of the rivers. There was, however, evidence that the climate had once been moister, and the steppe, at least partially, covered with woods, for tree-roots are to be found in the ground in several places. Some lonely larches, straggling at long intervals, frequently on the summits of the Devonian sandstone cliffs, are now the last remains of the woods covering these tracts of land in former times. Now there is not even sufficient

fire-wood, and the traveller, when undertaking a journey here, will have to carry with him the necessary fuel. Already previous travellers through the steppe regions of Asia have observed that the tree vegetation occurring at all on the steppes, is especially to be found on the hilly ranges. TANFILJEW and others, who have studied this more closely, are, as is known, of opinion that one reason of the steppes wanting trees is the salinity of the soil, and that the forest will advance in proportion as the soil is being washed out. As this washing out of salt must be supposed to be going on first on the heights, at the watershed, the pioneers of the forest will accordingly find reasonable terms and appear first in these places. Although this supposition may possibly agree in some cases, it cannot, however, be adopted for all, and for instance not for the Abakan Steppe, where, as mentioned above, formerly, in a moister period, the steppe was wooded. On the contrary, from my own experience in other regions, I consider these lonely larches on the ridges as the last remains of those forests in former times also extending over the lower parts.

There are, on the other hand, indications that the treelessness of the steppe is not always due to the long-continued drought only, for trees are also wanting in places on the steppe where the soil is moist or even swampy all the year round, and where the water — to judge from the general character of the vegetation — is quite fresh.

During my stay on the Abakan Steppe, I collected a number of tree-samples in the ground, and after my return home I have subjected them to an investigation with the microscope. As the structure of these samples, thousands of years old, was, as might also be expected, somewhat decayed, I have not been able to settle definitely whether they originate from spruce or larch, the microscopic wood structures of which, as is well-known, resemble each other so much that it is difficult to distinguish them, even in fresh material. There are, however, features indicative of the samples consisting of larch wood.

Fig. 3 From the Abakan Steppe near Ust Abakansk.

The Abakan Steppe is now, in the main, a dry, grassy steppe, most of the vegetation being made up of a thin cover of plants, chiefly composed of various species of grass, averaging from 20 to 30 cm. in height, above all *Festuca ovina subspec. sulcata* and *Koeleria gracilis,* growing so far apart as to expose the dry, naked soil. For the rest, the plants occurring sparsely in admixture with these species of grass, vary according to the conditions of moisture and the character of the soil. In these regions, the character of the vegetation is, above all, dependent on the conditions of moisture. On the islets in the river and along the banks, hydrophile and mesophile plants are to be found, but, only at a short distance from the river these conditions are changed, and the xerophile typical steppe vegetation predominates.

In point of the floristic conditions, the region here may therefore, for the purpose of a general view, most conveniently be divided into the vegetation of the islets and the river-banks, and the vegetation of the steppe proper, the former chiefly with mesophile and hydrophile plants, the latter in the main consisting of xerophile ones.

The Vegetation of the Islets and River-Banks.

The river Abakan, like the Yenisei, here in the plain-land divides into numerous branches, the so-called «protoks», so as to form a great variety of larger and smaller moist

Fig. 4. Typical scenery from an islet in the river Abakan near Uibat. Natural meadow with scattered bushes of *Salix daphnoides.*

islets, the soil of which is generally very fertile, consisting of black earth, or here and there of more sandy earth. Some of these islets are pretty large, up to several wersts in length, and their surface is roughly on a level with the low steppe along the river, and, like the steppe, quite flat and smooth. There is in these islets moisture enough to contribute to the growth of an exceptionally luxuriant vegetation, really constituting small oases in the waste, where are to be found numerous species of plants which have nothing in common with the vegetation of the surrounding steppes. The vegetation is in the main composed of boreal and subboreal species of plants. Several trees and shrubs are to be found here as well, forming here end there dense thickets, from 2 to 5 m. high, for instance of various species of *Salix*, along the banks, but elsewhere scattered over the islands, interspersed with larger and smaller, open, rich, natural meadows, giving the land an open, park-like appearance. In June the vegetation of the meadows was very luxuriant, averaging about 75 cm. in height. The flora on a small islet of this description,

Fig. 5. Natural meadow on an islet in the river Abakan near Ust Kamuishto. The vegetation consists mainly of *Thalictrum minus, Thalictrum simplex, Onobrychis viciaefolia, Hemerocalis flava, Pleurospermum austriacum* besides various grasses and sedges. In the background species of *Salix*.

about ½ werst long, and 200 to 250 m. broad, situated near Ust Abakansk, and visited by me at the beginning of June, may be mentioned here as an instance of the vegetation in such localities. The soil here consisted of common black earth with smaller fields of

drier and sandy material farther inland. Of shrubs and trees the following were to be found:[1])

Salix viminalis var. Gmelini f. rufescens, Salix cinerea × *S. viminalis var. Gmelini, Salix triandra, Salix daphnoides, Cornus alba, Prunus Padus, Populus laurifolia, Betula verrucosa, Rosa cinnamomea, Rosa acicularis,* and *Myricaria davurica* (among pebbles on sandy river-banks).

Fig. 6. Islet in the river Abakan. Thicket of *Salix viminalis var. Gmelini*

In thickets a ground flora was to be found chiefly consisting of the following species:

Vicia sepium, Primula patens, Polygonatum officinale, Cacalia hastata, Humulus Lupulus, Lamium album, Galium boreale, Veronica pseudolongifolia nov. spec., Galium Molugo, Potentilla ternata, Chelidonium majus var. grandiflorus, Valeriana officinalis, Lysimachia vulgaris and *Carex Arnelli.*

The islets, of course, mostly consisted of natural meadows, densely clothed with a luxuriant growth of various species of grass, of which, however, only comparatively few were flowering at that time. Among the plants characterizing the meadows was, above all, predominant the pretty, white, large-flowered *Anemone silvestris,* occurring here in abundance, and, moreover the following appeared:

Glecoma hederacea, Taraxacum officinale, Taraxacum Printzii DAHLST. *nov. spec., Taraxacum laevigatum, Potentilla ternata, Potentilla anserina, Rumex Acetosa, Rumex*

[1]) In this enumeration as well as usually also in the following ones, I have given the plants in succession, as put down in my diaries. This gives, at least to some degree, an idea of the dominance of the various species. In order to illustrate the composition of the vegetation I generally give, as far as possible, complete lists of plants for each locality, and accordingly not only of the most characteristic ones. I do not consider the said method to be superfluous in this connection involving tracts of land which in point of botany are so unknown as in the present case.

Acetosa var. hirtulus, Rumex thyrsiflorus, Urtica dioica, Trifolium repens, Plantago media, Camelina microcarpa, Plantago major, Ulmaria Filipendula, Cirsium arvense, Sanguisorba officinalis (only leaves), *Thalictrum minus, Thalictrum simplex, Stellaria discolor, Galium boreale, Hemerocalis flava, Primula farinosa, Polygala comosum forma, Artemisia spec., Stellaria longifolia, Myosotis silvatica, Barbarea arcuata, Alopecurus pratensis, Equisetum pratense, Ranunculus acer f. squarrosus,* and *f. Stevenii, Plantago media var. Urvilleana.*

In slightly moister habitats, near river-banks, etc, are to be found:

Ranunculus repens, Galium uliginosum, Potentilla anserina, Scirpus alpinus var. oliganthus, Ranunculus, reptans, Ranunculus subsimilis nov. spec., Myosotis palustris var. nemorosa, Viola pumila, Rumex aquaticus, Ulmaria pentapetala, Poa trivialis var. multiflora, Carex leporina, Equisetum arvense, Hierochloë odorata f. pubescens, and in muddy and partially inundated places *Cicuta virosa, Scirpus palustris, Lysimachia thyrsiflora, Alisma Plantago, Lycopus europaeus, Polygonum Hydropiper, Polygonum amphibium f. aquaticum, Scirpus silvaticus, Petasites laevigatus, Equisetum Heleocharis, Carex caespitosa, Carex vesicaria, Caltha palustris, Menyanthes trifoliata,* and *Callitriche verna* are the most conspicuous.

Fig. 7. From one of the small islets in the river Yenisei near Ust Abakansk. Grassy field with *Salix.*

In drier and sandy soil farther inland, the same xerophilous plants partly occur which are to be found on the surrounding steppes, viz:

Hordeum secalinum var. brevisubulatum, Libanotis montana var. sibirica, Avena planiculmis, Anagallidium dichotomum, Draba nemorosa var. leiocarpa, Gentiana humilis, Ulmaria Filipendula, Hypochaeris maculata, Senecio campestris, Androsaces septentrionale, Lychnis sibirica, Artemisia sericea, Carex pediformis, Carex stenophylla, Carum Carvi, and Myosotis intermedia.

As an instance of the flora of a somewhat larger islet with a rather strongly marked humus soil may be memtioned an islet in the river Abakan, between the village of

Askys and Ust Kamuishto. The islet was several wersts in length, but its highest point was only a couple of meters above the surface of the river. The vegetation was very luxuriant, and over 100 different species were collected here by me. In places along

Fig. 8. Small islet in the river Abakan. The bank of the river grown with shrubbery of *Salix* and species of *Carex*.

the banks where the ground was not too much exposed to the erosion of the river, there was generally a dense jungle, from 2 to 5 m. high, consisting of various species of *Salix*, above all *Salix viminalis var. splendens, Salix viminalis var. Gmelini f. rufescens, Salix daphnoides, Salix daphnoides var. rorida, Salix livida subspec. cinerascens var. occidentalis*, and *Salix triandra*.

These species were scattered, besides along the river-banks, all over the islet, accompanying *Populus nigra* — the latter here and there forming high, old trees — moreover of *Populus laurifolia, Populus tremula, Betula verrucosa, Rosa acicularis, Rosa*

Fig. 9. Islet in the river Abakan, *Salix viminalis var. Gmelini* and *Populus nigra*.

cinnamomea, Crataegus sanguinea, Cornus alba, and *Larix sibirica.* Of the last mentioned one only a few specimens were to be found in the interior of the islet, in a rather drier and gravelly meadow.

The meadows here were generally somewhat moist and very luxuriant, with a vegetation in places reaching nearly shoulder-high. Here is a list of the most important species belonging to such localities:

Valeriana officinalis, Archangelica decurrens, Pleurospermum austriacum, Veratrum album (leaves) *Heracleum dissectum, Onobrychis viciaefolia, Trifolium Lupinaster, Lathyrus pratensis, Lathyrus tuberosus, Hemerocalis flava, Vicia amoena, Thalictrum minus, Thalictrum simplex, Polygonum undulatum var. alpinum,* and *Cuscuta europaea.*

Fig. 10. From an islet in the river Abakan near Ust Abakansk. Meadow with *Pleurospermum austriacum, Onobrychis viciaefolia, Sanguisorba officinalis, Orobus tuberosus.*

Where the vegetation was less dense and lower, were to be found:

Medicago falcata, Vicia tetrasperma, Medicago lupulina, Ranunculus acris, Ranunculus polyanthemos, Hordeum secalinum, Poa alpestris, Poa trivialis, Poa palustris, Alopecurus pratensis, Avena pubescens, Avena pubescens var. alpina, Bromus inermis, Bromus inermis var. aristatus, Dactylis glomerata, Carex curaica, Juncus compressus, Mentha arvensis, Polygonum viviparum, Polygonum aviculare, Polygonum Bistorta, Euphrasia Jaeschkei, Galium boreale, Galium Aparine, Stellaria crassifolia subspec. paludosa, Stellaria discolor, Anemone silvestris, Myosotis palustris var. nemorosa, Lathyrus palustris, Trifolium repens, Tragopogon pratensis var. orientalis, Cirsium arvense, Herminium Monorchis, Plantago major, Plantago media var. Urvilleana, Potentilla anserina, Halenia sibirica, Geranium pratense, Camelina microcarpa, Sisymbrium Sophia, Vicia cracca, Vicia amoena, Potentilla flagellaris, Taraxacum Bessarabicum, Taraxacum laevigatum, Cypripedilum macranthon, Cypripedilum guttatum, and *Rumex Acetosa.*

In slightly moister meadows were to be found besides some of the above-mentioned: *Juncus bufonius, Beckmannia eruciformis, Carex leporina, Polygonum amphibium f. terrestre, Androsaces Gmelini, Pedicularis palustris, Geranium sibiricum, Nasturtium palustre, Cirsium palustre,* and in muddy, swampy places, especially in still creeks and in pools with stagnant water the most conspicuous species are:

Fig. 11. From an islet in the river Abakan near Ust Kamuischto. *Hemerocalis flava, Thalictrum minus, Thalictrum simplex* and various species of grasses. In the background *Salix* and *Rosa.*

Scirpus palustris, Alisma Plantago, Batrachium fluviatile, Cicuta virosa, Armoracia sisymbrioides, Cenolophium Fischeri, Carex orthostachys, Carex intermedia, Scirpus acicularis, Utricularia vulgaris, Sium cicutaefolium, Phragmites communis, Bulliarda aquatica, Petasites laevigatus, Lysimachia thyrsiflora, Lysimachia thyrsiflora var. davurica, Polygonum amphibium f. aquaticum, Potamogeton perfoliatus, Polygonum Hydropiper, Carex vesicaria, Carex vesicaria var. alpina, Carex gracilis var. erecta, Equisetum Heleocharis, Hippuris vulgaris, Bidens tripartita, Ranunculus sceleratus, and *Eriophorum angustifolium.*

In rather dry meadows also here a flora predominates with many species in common with that of the surrounding steppes:

Galium verum, Thesium refractum, Peucedanum vaginatum, Poa attenuata, Anagallidium dichotomum, Hypochaeris maculata, Stellaria dichotoma, Erodium Stephanianum, Erysimum hieracifolium, Crepis tectorum, Arabis hirsuta, Vincetoxicum sibiricum, Carum Carvi, Libanotis montana var. sibirica, Senecio Jacobaea, Dontostemon micranthus, Festuca rubra, Festuca rubra var. arenaria, Carex diluta, Carex heterostachya.

The shady space in thickets is occupied by a vegetation consisting mostly of:

Vicia amoena, Vicia sepium, Vicia cracca, Vicia unijuga, Trifolium Lupinaster, Cacalia hastata, Lysimachia vulgaris, Tanacetum vulgare, Polygonatum officinale, Primula patens, Scutellaria scordiifolia, Veronica pseudolongifolia nov. spec., Ulmaria pentapetala, Potentilla sibirica var. genuina, Rubus saxatilis, Rubus idaeus, Pedicularis resupinata, Solanum Dulcamara var. persicum, Inula salicina, Artemisia vulgaris, Pleurospermum austriacum, and *Calamagrostis epigeios.*

Among sand on the river-banks *Melilotus albus, Pulsatilla vulgaris, Thesium refractum, Rumex Acetosella, Vincetoxicum sibiricum,* and *Iris ruthenica* frequently occurred.

The above plants from these two localities constitute the ordinary vegetation of all the islets examined by me in the rivers Yenisei and Abakan. In some places a few other species may also occur. Thus, in thickets of *Populus laurifolia, Populus nigra, Populus tremula,* and various species of *Salix* on an islet near Ust Abakansk, were furthermore to be found *Agrimonia pilosa, Geum Aleppicum, Melandryum album,* and in moist meadows *Cnidium venosum,*

Larger and smaller banks and shoals formed by copple-stones are very common in the river, and where the stream is not too rapid, they are grown with *Petasites laevigatus* which is a plant very typical of similar localities.

Fig. 12. Low islets with thickets of *Salix* in the river Abakan. In the background the dry, barren steppe

The nearest surroundings of the rivers are also, as mentioned above, covered with various trees and shrubs of the same kind as those to be found in the islets. The ground

flora of the first-mentioned localities as well, agrees perfectly with that of the islets. But only at a short distance from the river, the character of the vegetation is changed. The moisture of the soil decreases rather quickly, and the brownish-grey steppe appears, with a poor and rather monotonous vegetation. In depressions on the steppe not far from the river, there is frequently moisture enough for forming small, shallow swamps with a richer flora. In such a depression on the Abakan Steppe, not far from the village of Askys, I have observed the following plants:

Poa pratensis, Poa alpina, Poa irrigata, Poa alpestris, Poa palustris f. stolonifera, Carex capillaris subspec. densiflora nov. subspec., Carex panicea, Carex atro-fusca var. coriophora, Carex tomentosa, Carex gracilis, Carex Goodenoughii, Carex vesicaria, Carex intermedia, Carex orthostachys var. typica, Hordeum secalinum var. brevisubulatum, Scirpus alpinus var. oliganthus, Scirpus Tabernaemontani, Scirpus palustris, Glyceria aquatica, var. arundinacea, Phragmites communis, Phalaris arundinacea, Agrostis canina, Juncus bufonius, Juncus Gerardi, Androsaces Gmelini, Orchis militaris × O. simia, Orchis angustifolius, Orchis simia, Orchis latifolius var. tenuior, Orchis angustifolius var. Friesii, Orchis incarnatus, Cypripedilum macranthon, Herminium Monorchis, Polygonum amphibium, Ranunculus acris, Caltha palustris, Trollius asiaticus, Anemone silvestris, Potentilla anserina, Cardamine pratensis var. parvifolia, Primula sibirica var. brevicalyx, Pedicularis palustris, Lysimachia thyrsiflora, Triglochin palustre, Plantago major, Petasites laevigatus, and *Equisetum Heleocharis var. fluviatile.*

In other places, in similar depressions with more sandy earth, for instance about the river U i b a t, the steppe was observed in the flowering season to resemble a large blue sea nearly exclusively consisting of *Iris ensata.* Farther into the steppe are also to be found a number of larger or smaller lakes and swamps, but the water here is salt, and the plant life in and about them is therefore quite differing and will be entered into at a greater length in the following survey of the vegetation of the steppe.

The Steppe Vegetation.

The Abakan Steppe appers to be one large, continuous plain extending for hundreds of wersts in every direction, almost entirely smooth and flat, like a floor. The vegetation differs somewhat in the various places according to the conditions of the soil, which, in some places, is almost quite dry and waste. In the main, however, it may be said to be a typical grass-steppe with some few predominating species, above all *Koeleria gracilis* and *Festuca ovina var. sulcata* covering the ground with a vegetation so sparse as to lay open to the view the greyish-brown or greyish-yellow earth. These species of grass are themselves not of a fresh green either, but of a more greyish-green or yellowish-green colour, thus giving the whole steppe, even early in summer, a monotonous, withered, and dry appearance. The composition of the vegetation may, however, differ considerably according to the character of the soil. As instances of the vegetation of the steppe I shall therefore in the following mention the different species occurring in the

various pretty typical situations I have met with. The different plant-societies merge of course gradually into each other.

Fig. 13. From the Abakan Steppe near Askys. Typical grass-steppe mainly with *Koeleria gracilis* and *Festuca ovina subspec. sulcata*. In the background reddish-grey Devonian sandstone hills reaching 100—150 m. above the ground.

On sandy steppes near Ust Abakansk on the eastern bank of the river, I have collected the following plants at the beginning of June:

Koeleria gracilis, Festuca ovina var. sulcata, Carex supina, Carex pediformis, Carex stenophylla, Stipa pennata var. Joannis, Triticum cristatum var. imbricatum, Eritrichium pectinatum, (especially commom on the «Kurgans») *Androsaces maxima, Echinospermum Lappula var. anisacanthum, Astragalus stenoceras, Potentilla soongorica subspec. glandulosa nov. subspec., Leptopyrum fumarioides, Thermopsis lanceolata, Alyssum alpestre, Astragalus testiculatus, Onosma echioides var. Gmelini* (some few scattered specimens here and there somewhat overtopping the common low steppe vegetation, are visible at a great distance because of their gaudy light yellowish colour), *Iris flavissima*, and *Cotyledon spinosa* (in June only found rosettes).

In rather stony places, on declivities, etc., are here to be found *Lychnis sibirica, Potentilla subacaulis, Thymus Serpyllum var. angustifolium, Thalictrum petaloideum, Oxytropis pilosa, Scrophularia incisa*, and *Dracocephalum nutans.*

Here and there on the steppe are to be found some slightly moister slopes with open brushwood consisting chiefly of *Caragana arborescens* and *Cotoneaster melanocarpa,* and with the following plants characteristic of these habitats:

Spiraea hypericifolia, Scorzonera radiata, Solidago Virgaurea, Aster alpinus, Gentiana humilis, Iris ruthenica, Iris ensata, Hesperis matronalis var. sibirica, Myosotis

silvatica, Polygala comosum forma, Stellaria Bungeana var. latifolia, Stellaria graminea, Cerastium arvense, and *Fragaria viridis.*

Near Askys, along the western bank of the river, there extends a dry steppe, up to several wersts broad, within which ridges rise to an altitude of from 100 to 150 m. The soil of the steppe itself seemed to consist here mostly of sand, here and there in admixture with black earth, which is too dry, however, for successful agriculture. Nearer the hills, the ground becomes gradually more stony, passing by degrees into the dry sandstone cliffs themselves, making the sides of the hills. From the summits of these hills may be surveyed westwards an enormous, rugged rock-steppe, of a dry and brown, almost desert-like, appearance, consisting of reddish-brown hills of Devonian

Fig. 14. View over the Abakan Steppe westwards. Rock-steppe, consisting of Devonian sandstone, almost desert-like. One the ridge in the foreground may be observed three lonely larches.

sandstone, with dried up river-beds. The soil is accordingly very poor, the rocky ground is either quite bare or only covered by a thin layer of earth, and with an extremely sparing and monotonous flora, which, however, I had no opportunity of examining more closely. To the east, the Abakan Steppe itself may be viewed, extending as far as the eye reaches, level and smooth, of a uniform, brownish-grey colour, the river-bed being marked out as a green stripe on this monotonous plain. The steppe is here a typical grass-steppe. To illustrate the composition of the vegetation here, I give the following list of plants found by me:

Koeleria gracilis, Festuca ovina var. sulcata, Festuca rubra, Festuca rubra var. arenaria, Triticum caninum var. geniculatum, Agropyrum pseudo-Agropyrum, Phleum Boehmeri subspec. decurtatum nov. subspec., Avena Schelliana, Avena pratensis, Stipa

capillata var. Joannis, Triticum repens, Poa attenuata, Agrostis canina, Carex pediformis, Carex stenophylla, Cobresia spec., Avena desertorum, Avena pratensis, Diplachne squarrosa; more interspersed there also occur here the pretty, brimstone-coloured *Erysimum altaicum* and *Silene Jenisea, Cymbaria davurica, Bupleurum multinerve, Onosma echioides var. Gmelini, Cerastium arvense, Scorzonera radiata, Convolvulus Ammani,* especially on the «Kurgans» (generally accompanying the preceding one), *Helichrysum arenarium, Galium verum, Echinospermum Lappula var. anisacanthum, Lithospermum officinale,* and *Linum perenne.* Moreover, on more stony ground, and on the Devonian cliffs of sandstone there occur:

Stellaria petraea, Potentilla sericea var. genuina, Campanula sibirica, Patrinia sibirica, Caragana pygmaea, Veronica Teucrium, Thymus Serpyllum var. augustifolius, Alyssum lenense, Dracocephalum discolor, Serratula nitida var. glauca, Potentilla bifurca, Polygala sibirica, Phlomis tuberosa, Allium clathratum, Allium tenuissimum, Thesium refractum, Crepis tenuifolia, Lilium Martagon, Spiraea triloba, Astragalus stenoceras, Astragalus multicaulis, Thalictrum foetidum, Linaria odora var. major f. angustifolia, Artemisia commutata, and *Sibbaldia adpressa.*

Vegetation on extremely dry and hot rocks.

Hardly any vegetation whatever was to be found in the especially dry and hot places on the declivities of the rocks. Here the ground is either quite bare or covered only by a thin layer of earth, deficient in organic mould and chiefly formed by disintegration of the rock itself. Only a very scattered flora was observed in the chinks of the rocks, such as *Ephedra vulgaris, Atraphaxis frutescens, Arctogerron gramineus, Thymus Serpyllum var. angustifolius, Phelipaea lanuginosa,* and *Oxytropis stenophylla subspec. caulescens nov. subspec.*

These seemed to be the only plants occuring here in such extremely dry and hot places. The soil is too dry and shallow, the sun too burning for the thriving of other plants.

On the mountain sides, in gravel, etc., along dried up river-beds I have noted the following species:

Galium verum, Glycyrrhiza uralensis, Atraphaxis frutescens, Aster alpinus, Caragana pygmaea, Thymus Serpyllum, Potentilla anserina, (a very densely silver-hairy form) *Lamium album, Cotoneaster melanocarpa, Campanula glomerata, Alyssum lenense, Thalictrum petaloideum, Thalictrum foetidum, Stellaria petraea, Cynoglossum officinale, Spiraea triloba, Polygala comosum forma.*

About Ust Kamuishto, the steppe itself seemed to be not quite so dry as in the said localities, giving rise to a considerably greater amount of other plants besides some of the above-mentioned grasses, which here are not so predominant either as regards quantity or quality. A mumber of Abakan Tatars have settled here in peculiar eight-sided wooden huts, the so-called Uluses, finding sufficient grazing-grounds for their herds of cattle near by.

The most important species generally occuring in the steppes here are:

Koeleria gracilis, Festuca ovina var. sulcata, Phleum Boehmeri subspec. decurtatum nov. subspec., Poa attenuata, Elymus dasystachys var. salsuginosus, Carex pediformis

Dianthus chinensis, Potentilla multifida, Potentilla bifurca, Artemisia sacrorum, Artemisia scoparia, Achillea Millefolium, Achillea Millefolium var. setacea, Carduus crispus, Eritrichium pectinatum, Echinospermum Lappula var. anisacanthum, Arabis incarnata, Thesium refractum, Linum perenne, Allium anisopodium, Urtica cannabina, Urtica dioica, Urtica urens, Veronica pinnata, Veronica incana, Atriplex patulum, Sisymbrium junceum, Glycyrrhiza uralensis, Dracocephalum Ruyschiana, Silene Jenisea, Chenopodium rubrum, Cymbaria dauurica, Linaria odora var. major f. angustifolia, Bupleurum falcatum subspec. bicaule var. angustifolium, Iris ensata, and somewhat more rarely, *Poa tianschanica, Koeleria Delavignei,* and *Euphorbia Esula.*

In somewhat more stony places about Ust Kamuishto, among sand, on rocky slopes, etc., the dominant species are:

Ephedra vulgaris, Atraphaxis frutescens, Gypsophila Gmelini, Thalictrum foetidum, Thalictrum petaloideum, Silene chlorantha subspec. glutinosa nov. subspec., Silene Otites var. parviflora, Libanotis montana var. sibirica, Leonurus tataricus, Dracocephalum nutans, Panzeria lanata, Nepeta lavandulacea, Veronica Teucrium, Statice speciosa, Adenophora liliifolia var. genuina modif. nana, Carduus crispus subspec. monocephalus nov. subspec., Serratula nitida var. glauca, Spiraea media, Aster alpinus, Achillea impatiens.

Quite near the Uluses the following herbs are the most important: *Hyoscyamus niger, Urtica cannabina, Urtica urens, Urtica dioica, Chenopodium rubrum, Plantago media, Polygonum aviculare,* and *Carduus crispus.*

In some places here the soil proved to be slightly saline, which was also found to be the case in other places on the Abakan Steppe. In such habitats were frequently to be found: *Potentilla bifurca, Potentilla multifida, Arabis incarnata, Astragalus sulcatus subspec. Turczaninowi nov. subspec., Veronica incana, Nepeta lavandulacea, Statice speciosa, Artemisia scoparia,* and some few others.

Near Ust Kamuishto occur large areas of swamps, partly with fresh or nearly fresh water, partly with brackish or salt water. There is no outlet to the water, which is fresh near the mouth of the small river flowing into the swamps, but at some distance from the mouth, the water gradually becomes more saline, with a typical halophilous vegetation. Thus, near the mouth of the river, there occur the following plants: *Bidens tripartitus, Hippuris vulgaris, Ranunculus sceleratus, Eriophorum angustifolium, Veronica Anagallis, Utricularia vulgaris, Atropis distans, Atropis tenuiflora,* and others. Here also occurs *Chara crinita,* covering in abundance the bottom of shallow water.

Vegetation in more or less saliferous soil.

In and about the more saliferous marshes, the following plants occur:

Carex diluta, Carex displodens nov. spec., Zannichellia pedicellata var. pedunculata, Glaux maritima subspec. pedunculata nov. subspec., Suaeda maritima, Salicornia herbacea var. stricta, Atriplex littorale, Juncus Gerardi var. atrifuscus and *var. salsuginosus, Ranunculus plantaginifolius, Potentilla anserina, Sisymbrium salsugineum, Plantago maritima subspec. ciliata subspec. nov., Lepidium cordatum, Lepidium latifolium, Lepidium crassifolium, Saussurea crassifolia, Triglochin maritimum, Primula longiscapa, Taraxacum leucanthum, Taraxacum Bessarabicum,* and *Scirpus rufus subspec. exilis nov. subspec.*

Here and there the marshes were quite dried up, and the grey, loamy, fissured ground covered with white salt-crystals. Here was an almost complete absence of vegetation, or only a poor flora consisting of some few scattered specimens of *Saussurea crassifolia, Lepidium crassifolium, Ranunculus plantaginifolius,* and more rarely, *Plantago*

Fig 15. The Abakan Steppe. Look-out on the salt swamps at Ust Kamuishto. In the foreground an Abakan Tatarian burial ground.

maritima subspec. ciliata nov. subspec., constituting the only vegetation.

In that territory of the Abakan Steppe, saliferous soil is very frequent, but the usual halophilous flora here did not seem to be very rich as regards the number of species. In the main, the same flora as mentioned above is met with in nearly all similar habitats, here and there, however, together with some others, as *Atriplex patulum, Kochia prostrata var. virescens, Atriplex sibiricum, Salsola collina, Artemisia Sieversiana,* and *Artemisia maritima.*

On the borders of Tagarski osero, a rather large salt lake to the south of Minusinsk, I have, in addition, collected *Aster Tripolium, Suaeda corniculata,* and *Plantago Cornuti.*

Due to the dryness of the climate, the Abakan Steppe is at present almost entirely uninhabited. Thus, drinking-water is to be found only in the rivers and the nearest surroundings, while the water not unfrequently to be met with in cavities on the steppe, is always more or less saliferous, and, accordingly, unsuitable for drinking. In many

places, however, the soil is deep and good, consisting of the same kind of black earth as occurs in the fertile territories further to the south-east. Only along the rivers there is moisture enough to constitute grazing-grounds, where no doubt, large areas, if cultivated, would give rich harvests. Accordingly, only in some few of the said places along the rivers there is a population, few in number, chiefly consisting of Abakan Tatars, the aboriginals of the country, living by breeding of cattle. Besides, here and there a few Russians are to be met with. The steppe being nearly unaffected by human culture and thus preserving its original stamp, there occur only here and there along the patches of field belonging to the scattered Russian population some weeds introduced by human agency. Thus, about the small, cultivated fields at Askys, I have found the following plants occuring as weeds:

Noxious weeds.

Thlaspi arvense, Sinapis alba, Linaria vulgaris, Alectorolophus major, Sonchus oleraceus, Sonchus arvensis, Cannabis sativa, Chenopodium album, Brassica Napus, Euphorbia Esula, Sisymbrium Sophia, Convolvulus arvensis, Atriplex sibiricum, often associated with *Aster altaicus,* and *Linum perenne.*

There is also further evidence that the earth of the steppe is fertile enough in itself, for in times long past when the climate was moister, there lived here a numerous and mighty tribe, which is no longer in existence. Thousands of burial-mounds, the

Fig. 16. The Abakan Steppe near Askys. Typical grass-steppe with Tschudian monumental stones with inscriptions.

so-called «Kurgans», bear witness to the former greatness of the steppe, when inhabited by the Tschudes, an expatriated and extinct race having reached a comparatively advanced stage of civilization already at a time when the darkness of barbarism was still brooding over Europe. The inscriptions on the tomb-stones, and tools to be found inside the graves, are indications that the said Tschudes mostly lived by farming and by breeding of cattle, their domestic animals consisting of species now extinct here or

which would no more be able to stand the dryness of the steppes. The remains of the «Tschudian canals», through which water was conducted into their fields, bear witness to the fact that already this primitive people here had difficulties in procuring the necessary supply of water.

Apart from the insect, the animal life of the steppe is now poor, and the stillness is here only rarely broken by the melancholy piping of some lonely bird of the desert or the scratching of a lizard in the dry grass. And the sepulchral mounds that we also meet with here, enhance, as it were, the serenity and quiet of this dying nature.

The Siberian Taiga Territory and the Urjankai Country.

The Transition Zone between the Steppes and the Primeval Forest.

As mentioned above, the southern and south-eastern parts of the Minusinsk district are moister. Only at a rather short distance from Minusinsk the scenery is changed, the steppe becoming gradually more rugged, and the rather small areas of wood frequently to be met with — generally consisting of pine, birch, and aspen — bear an unmistakable evidence to a greater moisture. Many of the subboreal plants characterizing the westerly steppe regions, here gradually dissappear, giving way to a vegetation mainly composed of boreal species of plants together with subarctic ones; the latter element especially being successively more frequent when going southwards to the Sayansk mountains, where the subalpine wooded tracts as to floristic conditions bear a markedly subarctic stamp.

In dry wood of *Pinus silvestris*, frequently in sandy soil, there occurs here a ground flora especially characterized by the pretty azure *Delphinium grandiflorum*, the yellow *Scabiosa ochroleuca*, *Rumex Acetosella*, *Erigeron acer var. elongatus*, *Onosma simplicissimum*, *Chamaerhodos erecta*, and on declivities *Hypericum elegans*, and in thickets *Vicia unijuga*.

The tract of land traversed during the first three or four days may really be considered as a transition zone between the steppe and the virgin forest further south; it forms, what is called by the Russians w o o d e d s t e p p e s (лѣсостепь) stretches with dry open woods, composed chiefly of various foliage trees — birches, poplars and others, partly also of larch — diversified by larger or smaller steppe-like areas between theme. The soil here nearly everywhere consists of the exceedingly fertile, black earth, 2—3 m. deep, rich in humus and chalk, and cultivated grounds become more frequent on proceeding southwards. From the hilltops here are seen to the south the pointed and ragged jags of the Sayansk mountains.

The scenery is, on the whole, very pleasant, a great number of park-like patches of wood having been left among the cultivated fields, and birches often making up veritable avenues along the roads. In some places the hillsides are overgrown with birches and other foliage trees and with a very luxuriant and varying undergrowth.

On a slope near the village of Taskina, I have recorded the following plants illustrating the composition of the vegetation and the striking difference between the

scenery here and that of the Abakan Steppe. The list was made in an area only of some 40 or 50 m.², in open brushwood of *Betula verrucosa, Populus tremula, Prunus Padus,* and *Rosa pimpinellifolia:*

Agrimonia pilosa var. dahurica, Galium verum, Hieracium spec., Achillea Millefolium, Dracocephalum Ruyschiana, Campanula glomerata, Hyphochaeris maculata, Achillea impatiens, Carum Carvi, Plantago media, Dactylis glomerata, Sanguisorba officinalis, Thalictrum simlex, Trifolium repens, Trifolium pratense, Brunella vulgaris, Galium boreale, Stellaria graminea, Hemerocalis flava, Phleum pratense, Plantago major, Linaria vulgaris, Tragopogon pratensis var. orientalis, Ranunculus acris, Erigeron acer, Taraxacum spec., Bunias orientalis, Chrysanthemum Leucanthemum var. ircutianum, Festuca elatior, Gentiana macrophylla, Ulmaria pentapetala, Lychnis flos cuculi, Trollius asiaticus, Poa annua, Aëra caespitosa, Poa palustris, Equisetum silvaticum, Heracleum dissectum, Polygonatum officinale, Rubus saxatilis, Primula officinalis var. macrocalyx, Geranium pseudosibiricum, Melandryum album, Inula salicina, Pteridium aquilinum, Epilobium angustifolium, and *Aconitum laeve.*

Cultivated plants.

Here the route leads through one of the very richest provinces of Siberia, with a mild and pleasant climate and a sufficient amount of rain. In spite of a rather defective cultivation of the ground, the fields, extending for miles, yield a rich supply of corn, especially of r y e, the rye-fields covering some 30 or 40 per cent of the cultivated ground. W h e a t is also grown successfully, the wheat-fields occupying about 30 or 35 per cent of the cultivated fields, and besides are to be found fields of o a t s and b u c k-w h e a t. F l a x and h e m p are grown as well, and a great quantity of hemp is exported from the Minusinsk region. P o t a t o-fields are more rarely to be seen. Moreover, c u c u m b e r s and w a t e r - m e l o n s are grown, and are sold in the market-places of Minusinsk at a price of only few kopek a-piece.

In these fields and near by, various weeds are to be found, of which I have observed the following occuring rather frequently:

Noxious weeds.

Thlaspi arvense, Galeopsis Tetrahit, Sonchus oleraceus, Sonchus arvensis, Papaver somniferum subspec. setigerum, Erodium cicutarium, Brassica campestris, Capsella bursa pastoris, Stellaria media, Polygonum tomentosum, Polygonum Convolvulus, Fagopyrum tataricum, Bunias orientalis, Agrostemma Githago, Centaurea Cyanus, Pisum sativum, Vicia sativa, Raphanus Raphanistrum, and *Turritis glabra.*

On the road or along the road-side here I have collected: *Lappa tomentosa, Plantago major, Plantago media, Polygonum aviculare, Juncus bufonius, Malva borealis, Matricaria discoidea,* here and there in rich abundance, *Lepidium apetalum, Trifolium repens,* and besides were s u n f l o w e r s, having grown from seeds dropped by the roadside, very characteristic. The seeds of this plant, abounding in oil, are extensively used for chewing by the inhabitants of these regions and also of all Russia. and very frequently offered for sale in their market-places.

Along the road there occur small thickets and groves, mostly consisting of *Betula verrucosa, Pinus silvestris,* and *Populus tremula,* with a rather luxuriant vegetation usu-

ally attending the woods of foliferous trees. Besides several species of *Salix* may, as the most conspicuous species here, be mentioned:

Rosa pimpinellifolia, Trifolium pratense, Agrimonia pilosa, Origanum vulgare, Hypericum hirsutum, Hypericum elegans, Gentiana macrophylla, Fragaria vesca, Galium verum, Galium boreale, Glycyrrhiza uralensis, Linaria vulgaris, Primula officinalis var. macrocalyx, Delphinium grandiflorum, Campanula sibirica, Campanula glomerata, Polygala comosum forma, Rubus saxatilis, Aster alpinus, Euphrasia tatarica, Poa annua, Trisetum flavescens subspec. copiosum nov. subspec., Anthoxanthum odoratum, Echinospermum Lappula var. anisacanthum, Cardamine impatiens, Lithospermum officinale, Scrophularia nodosa, Androsaces villosa var. dasyphylla, Geranium sibiricum, Avena pubescens, Matricaria inodora, Viola mirabilis var. subglabra, Ranunculus auricomus, Rumex Acetosella, Rumex arifolius, Chrysanthemum Leucanthemum var. ircutianum, Achillea impatiens, Allium lineare, Polygonatum officinale, Allium odorum, Medicago platycarpa, Medicago lupulina, Festuca elatior, Silene repens, Silene inflata, Leonurus tataricus, Iris ruthenica, Nepeta nuda, and *Aconitum barbatum.*

About the village of Karatus, the character of the scenery is changed. As far as this place, the land is open to the view, bearing, in spite of a somewhat higher degree of moisture, the impress of the neighbouring large steppes. There is also an indication of this in the character of the fauna worth mentioning, for all the way between Minusinsk and Karatus may be observed great numbers of small rodents, the so-called «Suschlisk» *(Spermophilus eversmannii),* typical animals of the steppe, and their innumerable holes in the ground.

About Karatus these small animals also disappear. Here the way leads into the valley of the river Amyl, with very rugged surroundings, where the solid rock begins to appear. The lofty hills and steep mountain sides are clothed with an exceedingly rich tree vegetation, chiefly consisting of birch, alder, and other foliage trees, but also gradually of spruce and pine, being the first indications of the proximity of the primeval forest. Here the first eruptive rocks are also to be seen bursting forth, and red Devonian sandstone-cliffs occur, alternating with higher eruptive masses, not unfrequently with larger and smaller flakes of Devonian sandstone shooting forth on the sides.

The flora here is — as might also be expected — much varying and luxuriant. The vegetation of the steppe and that of the foliferous trees meet in this zone the moist and shade-seeking vegetation of the coniferous forest. The varying geological subsoil, the great heat, and considerable moisture are factors which combine to an exceptionally luxuriant flora with a great variety of species.

Besides most of the plants already mentioned, there are frequently to be met with in thickets and on hillsides:

Melandryum album, Epilobium angustifolium, Geum Aleppicum, Vicia silvatica, Vicia sepium, Vicia cracca, Aconitum barbatum, Ranunculus acris, Ranunculus polyanthemos, Erigeron acer. f. politus, Potentilla norvegica f. genuina, Inula salicina, Veronica Chamaedrys, Chrysanthemum Leucanthemum var. ircutianum,

Hypericum perforatum, Hypericum Ascyron, Sagina procumbens, Tussilago Farfara, Veronica serpyllifolia, Veronica pseudolongifolia nov. spec., Cerastium vulgatum, Cerastium pilosum, Tanacetum vulgare, Stachys silvatica, Lamium album, Ulmaria Filipendula, Circaea Lutetiana, Solanum Dulcamara var. persicum, and *Lychnis chalcedonica.*

Wherever the ground is swampy, and in water-pools, are to found various helophytes and hydrophytes:

Carex caespitosa, Carex cyperoides, Parnassia palustris, Rumex aquaticus, Polygonum Hydropiper, Juncus filiformis, Ranunculus sceleratus, Alisma Plantago, Typha latifolia, Nymphaea candida, Sparganium simplex, Potamogeton natans, Sagittaria alpina, and *Lemna minor.*

On the banks of the Amyl, in sandy places *Salix caprea, Salix viminalis, Salix fragilis, Populus laurifolia, Dianthus superbus,* and *Pulsatilla patens* are commonly seen.

The first indications of the real taiga vegetation.

On moist wooded hill-sides accompanying spruce and fir, are especially to be found the following as the first representatives of the flora attending the real coniferous forest pushing forward here:

Heracleum dissectum, Carex tenuiflora, Carex loliacea, Aconitum laeve, Delphinium elatum, Geranium silvaticum, Pedicularis uncinata, Anemone dichotoma, Carex globularis, Majanthemum bifolium, Athyrium Filix femina, Onoclea Struthopteris, and *Pteridium aquilinum,* a plant-society becoming more and more widely distributed further to the south, and gradually richer in individuals as well as in species.

About Kushabar, the strata of the Devonian formation altogether come to an end, and the traveller enters the large area of eruptive rocks forming the Sayansk moun-

Fig. 17. View on the village of Kushabar. In the background the taige with the extreme spurs of the Sayansk mountains.

tains. In proportion as the geological subsoil changes in this way, a great number of the plants which are common in the more westerly regions, disappear, while new ones, especially with a more distinct subarctic stamp, creep in. The distance from Minusinsk to Kushabar does not exceed 120 wersts, but there is a considerable difference in the natural conditions of the two places. The village of Kushabar itself is grandly situated in a rugged, partly wooded country, on the edge of the forest zone, facing the snowy mountains to the south, and the country around is considered to be one of the best residences in all southern Siberia. It is situated on the boundary between the fertile Siberian soil and the Sayansk eruptive rocks. Here the fertile and well cultivated black soil area of the Siberian plain-land end, and in front extend immense areas of the most impenetrable type of Siberian virgin forest, called by the Russians the «b l a c k» or «m o i s t t a i g a», extending nearly unbroken over thousands of wersts as far as the Amoor Province, and forming a complete barrier against any progress of human culture this way.

In places, especially on level-land, there is often a remarkably sudden transition between the steppe and the taiga. As cut with a knife, the border of the primeval forest extends in a direct line; only a few steps, and the traveller from the sunny, open steppe enters the moist twilight of the virgin forest.

The climate here is very moist, showers occur at short intervals, and the transition from the dry climate in the more westerly steppe regions is very sudden. In spring, the weather is rather variable in this part of southern Siberia, and severe storms may arise suddenly, accompanied by great changes of temperature. In the first half of May, the temperature rises quickly from some degrees of frost to towards 30° C. of heat. In the second half of May, the weather is sunny and hot, the spring advancing very quickly.

As an instance of the composition of the vegetation here are given in the following a list of plants found by me on a dry and moderate dry mountain-side consisting of granophyr, just outside Kushabar.

Vegetation at Kushabar.

Betula verrucosa, Pinus silvestris, Populus tremula, Sorbus Aucuparia, Rosa acicularis, Crataegus sanguinea, Cornus alba, Ribes rubrum, Carlina vulgaris var. nebrodensis, Woodsia ilvensis, Epipactis latifolia, Verbascum Thapsus, Arabis incarnata, Agrimonia pilosa, Arenaria serpyllifolia, Myosotis intermedia, Potentilla argentea, Potentilla norvegica, Achillea Millefolium, Achillea impatiens, Hypericum perforatum, Hypericum hirsutum, Erysimum cheiranthoides, Lappa tomentosa, Cirsium lanceolatum, Tanacetum vulgare, Carum Carvi, Campanula glomerata, Carex pediformis, Calamintha Acinos, Lotus corniculatus, Fragaria vesca, Rumex Acetosella, Rubus saxatilis, Veronica Chamaedrys, Veronica agrestis, Polygonum dumetorum, Chelidonium majus var. grandiflorus, Rumex arifolius, Gentiana macrophylla, Taraxacum spec., Euphrasia tatarica, Euphrasia hirtella, Euphrasia Jaeschkei, Stellaria graminea, Stellaria uliginosa, Galium boreale, Plantago major, Plantago media, Urtica dioica, Trifolium pratense, Trifolium repens, Trifolium medium, Alchemilla minor, Alchemilla pastoralis, Polygala comosum forma, Linaria vulgaris, Sagina procumbens, Dactylis glomerata, Primula elatior var.

Pallasii, Anemone silvestris, Polygonum Bistorta, Ranunculus polyanthemos, Cirsium arvense, Potentilla anserina, Raphanus Raphanistrum, Phleum pratense, Glecoma hederacea, Thalictrum minus var. elatum, Viola canina, Veronica serpyllifolia, Brunella vulgaris, Rubus idaeus, Actaea spicata subspec. erythrocarpa, Geum Aleppicum, Crepi, lyrata, Anthriscus silvestris, Vicia cracca, Poa Chaixii, Humulus Lupulus, Spir, aea media Crepis sibirica, Lamium album, Pteridium aquilinum, Majanthemum bifolium Aconitum laeve, Heracleum dissectum, Onoclea Struthopteris, Erigeron acer, and *Paris quadrifolia.*

Fig. 18. *Heracleum dissectum* on a glade near Kushabar, July 11th 1914.

Moist slopes are rather common about Kushabar, from where the following plants may be mentioned as examples of the flora typical of similar habitats:

Picea obovata, Betula pubescens, Alnus fruticosa, Onoclea Struthopteris, Aconitum laeve, Delphinium elatum, Stellaria Bungeana var. latifolia, Ulmaria pentapetala, Scirpus silvaticus, and *Carex caespitosa,* which are the most common and very frequent.

Moreover, the following list of plants also occuring here may complete and serve as an example of the vegetation characterizing this place:

Pteridium aquilinum, Brunella vulgaris, Stellaria graminea, Anemone dichotoma, Adoxa Moschatellina, Stellaria media, Myosotis palustris var. nemorosa, Inula salicina, Anthriscus silvestris, Geum Aleppicum, Galium uliginosum, Juncus bufonius, Equisetum silvaticum, Trollius asiatius, Cirsium heterophyllum, Cirsium palustre, Parnassia palustris,

Juncus filiformis, Erodium cicutarium, Anchusa myosotidiflora var. grandiflora, Potentilla fragarioides, Viola pumila, Cardamine pratensis var. parvifolia.

Near habitations, in court-yards, on roads, etc., are to be found:

Stellaria media, Scrophularia nodosa, Potentilla anserina, Barbarea stricta, Poa annua, Plantago major, Hyoscyamus niger, Polygonum aviculare, Juncus bufonius, Capsella bursa pastoris, Thlaspi arvense, Souchus oleraceus, Sonchus arvensis, and *Chenopodium album.*

In loamy places here, in thickets on a brook, and in brushwood of *Alnus fruticosa,* I have collected *Impatiens noli tangere, Tussilago Farfara, Equisetum arvense, Veronica serpyllifolia, Inula salicina, Cardamine impatiens var. communis,* and in more swampy places *Menyanthes trifoliata, Agrostis alba, Caltha palustris, Eriophorum gracile,* and *Eriophorum vaginatum* are rather frequent.

The Sayansk Mountains and the Urjankai Country.

Natural Conditions.

At a rather short distance from Kushabar, the last of all inhabited places in this part of Siberia, the traveller finds himself in the genuine virgin forest, and after a couple of hours there are no more traces whatever of human agency to be found. This forest is formed by the outskirts of the immense «taiga» region, covering the northern slopes of the Sayansk mountains down to Siberia.

Fig. 19. Primeval forest near Kushabar. In the foreground trunks of cedar, and besides spruce and poplar with an undergrowth mostly of various species of ferns.

In point of natural conditions, these wooded regions agree rather perfectly with the large forests also to be found on the southern declivities of the Sayansk mountains in the so-called Urjankai country. Only the most northern parts of the Sayansk mountains belong to Siberia. The political frontier between Siberia and China, to which the Urjankai belongs, as forming a part of Mongolia, follows roughly the water-shed situated here at a distance of only about 150 wersts south of Kushabar. On the other hand, most of the mountains thus belong to the Urjankai country, filling up this nearly unknown region about the sources of the Yenisei. This, the Upper Yenisei Basin, which I passed through during the following months, is bounded on the north and west by the watershed of the Sayansk mountains, on the east by the Baikal mountains, on the south by the Tannu-Ola or Snowy mountains. The country is thus almost surrounded by high mountain masses, which form a secluded basin, and the bulk of which is situated in latitude 50—54°, and in longitude 90—100°. The greatest extent of the land is from the east to the west, and it is traversed throughout its length by the river Yenisei or Bei-kem, receiving here a great number of large tributaries from the mountains. The Urjankai country is reckoned to cover about 150.000 square wersts, of which nearly one third is likely to be arable ground. There are extensive grazing-grounds, affording excellent food for cattle.

In point of topography, the country is mountainous, being filled up with the Sayansk mountains and their spurs. Out of the forest there rise lofty mountains with white peaks, one behind the other, as far as the eye reaches. For thousands of wersts this gloomy, mountainous country lies quite waste and uninhabited, only rarely visited by some vagrant nomad. In this snow-clad mountain region, wooded valleys form indentations here and there, where the game leads an existence as undisturbed as in few other places in the world. The highest mountain masses are to be found in the east and north-east, where the Munku-Sardyk runs up to 3490 m., and where the Yenisei is considered to have its sources.

To the south and west the land becomes drier and lower, and near the Ulu-kem it is an arid, barren rock-steppe, passing directly into the Mongolian table-land across the dry and nearly treeless Tannu-Ola.

The Sayansk mountains are the most northern of the three mountain ranges extending east-wards from the Kolyvan Altai.

The mountains consist of various eruptive rocks, such as granite, syenite, porphyry, diabaze, diorits, etc., which have forced their way through the layer of the Devonian formation, carrying away, or, for a great part, covering the Devonian slates. In the boundary area, gneisses and metamorphic schists are first to be met with, and in the outskirts, the reddish-brown Devonian slates have been left as larger or smaller remains on the sides of the eruptive rocks down the mountain sides. In places layers from the Silurian and Carboniferous periods are to be met with near the boundaries of the eruptive rocks.

The mountains are not distinguished by any imposing altitudes, the highest summit being, as mentioned above, the Munku-Sardyk in the most eastern part of the mountain

mass. There are, besides, several groups of rather high mountains, for instance the Aradansk mountains to the west, on the Yenisei, the Usinsk mountains, the Artool mountains, etc, generally attaining to about 2500 m. above sea-level. On the contrary, the mountain masses are characterized by their wild formations, with pointed summits, lofty pillars of stone and steep precipices. In some places, however, there are flat high-plateaus covered with immense blocks of stone.

Fig. 20. From the Sayansk mountains near Ust Algiac, at the end of July 1914.

To the west, they are, accordingly, connected up with the Altai, and to the east with the Baikal mountains, thus forming a continuous mountain barrier, having been able to confine — in point of culture — the portions of Mongolia lying to the south, from Siberia. The Sayansk mountains may thus be said to form the boundary between Siberian and Mongolian scenery.

The Sayansk mountains are not a solitary and continuous mountain range, being interrupted or divided by small valleys and ramifications running in every direction, so as to make a mountain mass, filling up the greater part of the Urjankai country, especially its northern and eastern portions. These ramifications are separated from each other by deep valleys with steep sides, running up to towards 2700 m., and, accordingly, making the land still more impassable. But the uninhabited, swampy and pathless areas of virgin forest with masses of fallen timber, covering everywhere the subalpine mountain regions, are perhaps the chief factors in making these tracts of land so difficult of access to man.

Owing to the difficulties of penetrating into these mountain regions, the Urjankai land has been able to remain so isolated, making the district about the sources of the Yenisei a veritable *terra incognita*, with a population of natives, the so-called Soyotes, well hidden and protected against any progress of foreign civilization. Only few regions of the interior of Asia are so isolated and difficult of access as the land about the sources of the Yenisei. As yet no part of the basin has been mapped out systematically; the maps in existence are chiefly based upon the statements of the natives and, accordingly, not only very defective but in a great measure even erroneous on essential points. In every other respect the land is equally unknown.

The Sayansk range itself lacks detailed survey, and the same may be said of the encircling border ranges of the basin. The headwaters of most of the rivers are unknown, and the extensive regions between the Chua-kem and Bei-kem, the basin of the Chua-kem and the Kemchik are still awaiting their explorers. The country is «New Land indeed, where the mountains are nameless and the rivers all run God knows where».

Only in a couple of places the traveller is enabled to pass from Siberia into the Urjankai land. One of the routes, the most difficult and unknown, lying across the Algiac Pass and leading into the north-eastern part of the land, was followed by us. This route is passable only a few months in the summer, being the greater part of the year protected by ice and snow in the mountains and by the extensive, impenetrable swamps and dense forest in the subalpine regions. The other one, a riding-path, leading from Gregoriewska via Usinsk, is not so difficult, and accordingly better known. The access from the south, via Tannu-Ola, is easier, for which reason the land is also in closer contact with Mongolia proper and China, to the latter of which countries it may also be reckoned to belong politically.

In point of o r o g r a p h y, the Sayansk district is connected up with Mongolia, forming the north-western part of the Mongolian mountain table-land. The Sayansk mountains may be said to form the first step from the Siberian lowland up to the Mongolian plateau, and the Upper Yenisei basin to make up the first terrace; the Tannu-Ola, confining the basin to the south, forms the second step passing direct into the main table-land. The Sayansk mountains are no real barrier in point of the floristic conditions, the mountain ranges being crossed by lower, wood-clad passes by which the plants have been able to spread. With the exception of the south-western declivities facing the large Soyote Steppe about the Ulu-kem, the mountains themselves bear, both in floristic and faunistic respects, a markedly arctic and subarctic stamp.

Northerly species of plants in the Sayansk district.

This occurrence of northerly species so far south is especially interesting, being most likely suggestive of survivors from the glacial period. For a corresponding flora is now to be found in the subarctic and arctic portions of the Siberian lowland far to the north, north of the dry, hot south Siberian steppe region. In former times, in a colder period, this flora possibly also extended further to the south, over the large south Siberian steppes, but in proportion as the temperature rose and the climate became drier after the

glacial period, the ice retreated northwards and up into the mountains, followed by the arctic and subarctic flora, giving way to a steppe vegetation, which little by little immigrated into the dry south Siberian lowland, and isolated this arctic and subarctic floral colony to the south.

Remains of a flora of the high North on the steppes of southern Siberia.

In this connection I will also call to remembrance that among the plants already reported from the low-lying and dry steppe regions about Minusinsk, at an altitude of about 250 m. above sea-level, also some arctic and high northern plants were found by me, for instance:

Patrinia siberica, Aster alpinus, Carex capillaris subspec. densiflora nov. subspec., Stellaria Bungeana var. latifolia, Primula sibirica, Carex atro-fusca var. coriophora, Stellaria petraea, Potentilla sericea, Stellaria crassifolia, Myosotis silvatica, Lilium Martagon, Cobresia spec., Arctogerron gramineus, Scorzonera radiata, Moehringia lateriflora, and others

They occur here most frequently in small, scattered colonies within limited areas, especially in moist places, or also on the ridges of the sandstone hills, often together with solitary larches, surrounded on every side by the common xerophile vegetation of the steppe.

These plants should possibly be regarded as remnants from the flora of the former colder period in these regions, which have been able to survive here in the lowland, all of them being plants the geographical range of which mainly lies in northerly regions or in alpine and more elevated mountain tracts, in the same way as I consider the larches here to be the last remains of the forests of the past in these tracts.

Similar plants of the high North may also no doubt be found in many other places on these low-lying steppes. We know, it is true, that during the glacial period proper, large portions of the Siberian lowland here were covered with a great ocean, to the north connected with the northern Arctic Ocean, and to the south extending right down to central Asia, to the Caspian and Areal Sea, forming at this time a boundary between the vegetation of Europe and that of the remaining parts of Asia. As far as to its most southern limit this ocean must have had a perfect arctic character, for in the deeper parts of the Caspian Sea there are still to be found, according to what G. O. Sars has pointed out, arctic marine Crustacea, relicts of the arctic animal life which was predominant here at this time. When the sea receded from here, the climate must, however, in my opinion, still have been rather cold, and the flora and fauna immigrating and taking possession of this old, drained sea-bed, has been, albeit perhaps no longer absolutely strictly speaking arctic, at least of a high northern character.

This is evident from the remains of mammoths — débris of a fauna of the high North — which are of rather common occurrence in Siberia, and, lying upon these marine deposits, they are, accordingly, younger than this glacial transgression of the ocean. The remains of the mammoth, thus belonging to the younger Tundra stratifications, are to be found not only in northern Siberia but occur right down to the extreme south, as for instance also at Kushabar, where the year before our stay there, remains of

a mammoth had been dug out of a loamy hill near a brook. According to what we were told, discoveries of remains of mammoths were said to be rather common at the foot of the Sayansk mountains, and even on the south side of the mountains, right down into Mongolia, they were not rare. The ocean accordingly receded already at a time when the climate was at any rate still so cold that such northern species as the mammoth and the animal societies allied with it were able to occupy the steppes of southern Siberia, and together with this animal life there spread a corresponding vegetation of the high North, of which the bulk has now been expelled northwards, into the Tundras of northern Siberia and up into the high mountains, while a remainder may be traced in the above-mentioned species of plants. The tree-roots already mentioned, found by me in the steppe earth, are also remains of a subarctic vegetation in these regions.[1])

There are indications in the character of the vegetation here in northern Europe that when the last remains of this arm of the sea, already mentioned, disappeared, and a connection by land was established between the vegetation of Europe and Asia, the climate was no longer markedly arctic, but perhaps more precisely subarticticc, so that the bulk of the plants that were able to invade northern Europe, must properly be classed among the subarctic floral constituents. Unfortunately, Siberia is as yet very little known in point of Quaternary deposits, which is the more regretable from the fact that the knowledge of the conditions here is not uninteresting with respect to Scandinavia.

The fauna here in the Sayansk mountains also exhibits many northerly forms. Above all, the wild reindeer, which, according to the statements of the natives, are supposed to have been much more widely distributed in former times, but are now being reduced. Moreover, there occur here strongly defined northerly species, such as ptarmigans, and also the embergoose and many others. These have, indeed, in all probability, experienced a like fate as the arctic and subarctic floral constituent.

No systematic meteorological observations are recorded from the Yenisei basin. The climate is, as a matter of course, prominently continental, and very severe, the annual middle temperature being doubtless several degrees below zero, so it is very difficult to grow corn, even on the slopes with southern aspects. Sudden changes in the weather are rather frequent, and there is a great difference between the temperatures

[1]) While this work was printing, there has appeared a smaller treatise by the German chief physician and zoologist DR. WALTHER ARNDT: Zur Kenntnis der Verbreitung von *Planaria alpina* DANA (Zoologischer Anzeiger, Bd. L. Nr. ¾ 6. Dezember 1918), which is not uninteresting in this connection. DR. ARNDT, who lived as a physician for the prisoners of war in the Minusinsk district in 1915, has found that the arctic flat-worm *Planaria alpina*, also occurs in these regions. It is to be found here not only in the forelands of the Sayansk mountains right down into the steppe region, but even in the middle of the steppe area, in the affluents of the issueless salt lake Schira, lying north of Minusinsk, and in several other places it has been found by him. This little flat-worm has, after the works of W. VOIGT, treating of the connection between its distribution and the glacial epoch, become especially interesting. VOIGT has, as is known, according to the peculiar conditions of distribution of *Planaria alpina* in Europe, enounced the theory that it is to be considered here as a relict of the glacial epoch, and if this theory of VOIGT'S is to have universal validity, DR. ARNDT'S discovery is considerably interesting. The above-mentioned arctic plants, which I have pointed out in the lowland at an altitude of about 250 m. a. s. l., on the dry and hot south Siberian steppes about Minusinsk, are not, accordingly, the only survivors here from the glacial period, but are also accompanied by representatives of the arctic fauna once living here. As this little publication of DR. ARNDT'S is seen really to give an excellent support to my view that these plants are genuine glacial relicts, I beg to direct attention to it in this connection.

of day and night, winter and summer. The winter is severe, the temperature sinking down to ÷ 30—40° C., and, as a rare exception, still lower in alpine situations, but hardly as severe as the winter on the open Siberian steppes. On the other hand, the short and luxuriant summer is very hot, with temperatures rising to + 40° C. in the middle of the day, and not unfrequently sinking in the course of bright nights to degrees of frost. At that time of the year heavy rainfalls may occur, continuing without intermission for several days, often accompanied by heavy thunder-storms. The spring generally begins suddenly about the middle of April, when the Ulu-kem becomes free from ice, the wintry weather changing in a very short time into an intense heat, making the rivers swell very quickly, due to the water from the melting snows, carrying away everything that comes in their way. Great numbers of fallen trees are swept down the whirling, dirty-grey streams, and may be heaped up in immense piles on the banks. In places, pieces of timber with thorn off branches were heaped up in such masses as to form mighty mounds, looking as if they had been built on purpose. These masses of drift wood give the rivers in the Sayansk district a certain wild appearance.

The summer is luxuriant and fine, but short. In May everything shoots up suddenly, but at the end of July or the beginning of August, the plants already begin to wither on account of the night-frost commencing early. The first snow makes its appearance on the mountains already at the end of August. On the morning of the 21st of July I found the fields about Ust Algiac, 980 m. above sea-level, covered with rime. In spite of the continental situation there is, however, no want of rain, the middle annual rainfall being about 500—600 mm., while, in eastern Siberia, the average amount of rain only slightly exceeds 300 mm. The great moisture and therewith the wood is confined to the more elevated mountain tracts, above all on their northern sides. In places where the annual rainfall does not reach 200 mm., the wood disappears, and the steppe begins. The most important quantity of rain falls in the summer and autumn, and July is considered to have the greatest rainfall. The amount of rain is, however, very unequally distributed, and is subjected to considerable local variations. There is plenty of rain in the north and west parts of the mountains as well as at the great central elevations, but it decreases quickly southwards and south-westwards, the total annual rainfall about the Ulu-kem and Kemchik scarcely exceeding 200—300 mm. In winter, the precipitation is rather inconsiderable, and the amount of snow in this region accordingly very small, being about 15 cm., according to the statements of the natives. The cattle are therefore enabled to stay in the open and find their food in the grazing-grounds the whole winter. It is quite otherwise in the centre of the mountains and on the Siberian side of them, where the snow is often 3 m. deep. During the frequent storms the snow is heaped up in huge drifts, continuing till far into the summer before melting, if disappearing at all. Northerly or north-westerly winds are mostly prevalent. At altitudes exceeding 2200—2300 m. above sea-level, the ground is covered with perennial snow and ice, and from the glaciers larger and smaller rivers take their rise, finally uniting into the mighty river system of the Yenisei.

Fig. 21. From the Sayansk mountains near the sources of the Sisti-kem, about 2100 m. above sea-level. Phot. July 24th 1914.

The country abounds in lakes and rivers; the main river is the Yenisei or the Bei-kem, as it is called by the natives, traversing the country from Munku-Sardyk north-westwards or westwards, and receiving several tributaries, of which may be mentioned the Ii, Dora-kem, Kamsara, Sisti-kem, Tapsa, and Chua-kem. The latter tributary is the largest one, and nearly as mighty as the main river itself. At the junction of these two rivers, where the Bei-kem emerges from the mountains, and the lowland begins, Bjelosarsk is situated, from where the mighty and broad river flows, under the name of the Ulu-kem, through a very dry, jagged steppe land, the average altitude of which is 550—800 m. above sea-level. In the Urjankai land it also receives the Kemchik, a considerable tributary, with a very large but comparatively dry basin. Roughly from the junction with the Kemchik, where the Siberian-Chinese border runs, the river turns, and flows, for the rest of its course, to the north into Siberia under the name of the Yenisei.

Summary of the Floral Conditions in the Sayansk Mountains and the Urjankai Country.

After this general view of the natural conditions of the region, as far as they are known, I will in the following, somewhat more closely, treat upon its vegetation. I only aim to draw the main lines and give a first rough survey of the flora of these tracts, having been til now, broadly speaking, quite unknown. There may thus only be laid a basis for future and more minute treatments of the floral conditions here.

In its main features the territory on both sides, on the northern as well as on the southern side of the Sayansk mountains are dry steppe regions, those to the north — as already borne out — with a common Siberian stamp, and in the transition zone between the steppe and the primeval forest with a vegetation having a distinctly boreal character, whereas the scenery south and south-east of the mountains, on the large, comparatively low-lying rock-steppes about the Ulu-kem, bear a more Mongolian stamp. Thus the Sayan and the Urjankaicountry may be said to form a transition or bondary zone between Siberian and Mongolian scenery. The Sayansk mountains proper, on the other hand, are moist, and up to a height of 1800—1900 m. above sea-level covered by dense, almost impenetrable coniferous forest. Owing to the fewness and short duration of my investigations, I have not been able to make any attempt at classifying the vegetation here into natural plant-societies. Only by way of suggestion I will mention that the following 4 main regions may be distinguished in their leading features:

1. The Subalpine Taiga or Forest Territory, comprising the Siberian north side as well as the Mongolian south side of the mountain masses, the flora of which has a markedly subarctic character.
2. The Alpine Region, comprising the loftier mountain tracts above the tree limit (about 1800—1900 m. above sea-level), where arctic species of plants are prevalent.
3. The Lower Steppe Area about the Ulu-kem, mainly with a Mongolian or central Asiatic stamp.

   Besides, it would be natural to separate here one floristic region more, viz.

4. The Wooded Steppe Region, a transition zone between the lower steppe areas and the subalpine taiga territory.

As is the case on the north side of the mountains, this region also comprises very large tracts in the Urjankai country, where especially occurring about the borders between the more elevated and, accordingly, moister eruptives together with the woodlands and the lower and drier Devonian areas forming the steppes. Thus, in the Urjankai country, these wooded steppes extend roughly from the Lower Sisti-kem southwards to the Dora Steppe, and from the outfall of the river Ujuk to towards Bjelosarsk, on the large Soyote Steppe, in the south-western part of the country, about the Ulu-kem. Moreover, all over the borders between the primeval forest and the steppes in this

country, there may no doubt be separated larger or smaller stretches, which, in point of the floral conditions, must be referred to the wooded steppe regions.

There are, of course, no sudden transitions between these floristic regions, the different natural conditions of which are, indeed, practically speaking, only dependent on the height above sea-level and therewith in closest intimacy with the amount of downpour, and where to draw the boundary line will therefore, in some measure, have to be left to individual judgement. The fact is that the downpour, as already mentioned, is here wholly dependent on the loftier mountains, and the moisture gradually decreases towards the lower tracts.

For further particulars of these 4 floristic regions in the Urjankai country and adjacent territories, I refer to the annexed map (no. 3), where I have made an attempt to indicate very roughly their distribution, as far as the country is known in this respect. Where nothing is inserted in the map, the country is as yet quite unknown in point of floristic conditions. Unfortunately, on such an expedition of short duration there is only little opportunity to study more closely each of these floral regions, and I will in the following survey only give a general phytogeografical description of the various localities where we stopped long enough to enable me to study the general composition of the vegetation. It will appear from this how the natural conditions, and accordingly the vegetation as well, change their character in the different parts of the country.

The first of the floristic regions met with by the traveller coming from the Siberian lowland, are the subalpine woodlands, which may also be supposed to be the region most widely distributed in the Urjankai country.

I therefore intend to treat upon this region first.

The Subalpine Taiga or Forest Territory.

In the loftier mountain tracts in the Sayansk district there is, as will appear, a comparatively copious downpour, and up to an altitude of from 1700 to 1800 m. above sea-level, the land is covered with a dense, often nearly impenetrable mixed coniferous virgin forest, chiefly consisting of *Picea obovata*, *Abies sibirica*, *Pinus Cembra var. sibirica*, *Pinus silvestris*, *Larix sibirica*, and of foliage trees are to be found less abundantly, especially *Betula pubescens*, *Populus tremula*, *Populus laurifolia*, *Alnus fruticosa*, and *Prunus Padus*, etc.

The bulk of the wood in the moist subalpine regions is made up of the three first-mentioned, viz. the spruce, the silver-fir, and the cedar, and in drier habitats also pine and larch occur.

From the summits of the loftier mountains may be viewed interminable areas covered with dense wood, the mighty, bushy and extensive cedar-crowns of a lighter colour mostly reaching higher than the surrounding trees and giving the forest a wild and ragged appearance. The spruce and the silver-fir are not able to maintain their

ground beside the gigantic cedar, and have to content themselves with a less ambitious place, half hidden between them. They constitute the greater part of the underwood, which is frequently so dense as to make it nearly impossible for the traveller to force his way, even in the subalpine regions, not far below the tree limit itself.

I will first in few words make mention of the most common species of trees composing the taiga proper.

Abies sibirica forms trees up to 30 or 35 m. high, measuring over 0,5 m. in diameter at a man's height. It is above all characteristic in constituting the moist, dark taiga together with the spruce and the cedar, and, to some extent, the birch and the aspen. In alpine situations it reaches nearly to the limit of tree vegetation, represented by isolated low specimens, more or less stunted, here however, being superseded by the spruce and the cedar. It is frequently to be found in loamy soil, and does not shun rather moist and swampy places, forming here and there underwood so dense as to compel travellers to cut out a way for the pack-horses by means of axes. In

Fig. 22. Subalpine virgin coniferous forest in the Sayansk mountains; the Upper Sisti-kem valley about 1600 m. above sea-level. The bushy cedar-crowns overtopping the level of the surrounding wood.

moist, moss-grown places, *Abies sibirica* frequently propagates by means of vegetative shoots, the lower branches trailing along the ground, or branches of fallen trees taking root and bending upwards at the summit. These shoots are at the beginning dorsiventral, like the branches forming them, but gradually pass into symmetrical ones. I have observed this fact in several places, for instance near Ust Algiac.

Picea obovata generally forms the greater part of the taiga, associated with the preceding one and the cedar. There are to be found trees over 30 m. high, and about 75 cm. in diameter at a man's height. In moist places, it frequently occurs together with the silver-fir, growing like the latter in alpine situations nearly up to the limit of tree vegetation.

Pinus Cembra var. sibirica especially occurs in more or less moist and swampy places. It does not generally form woods alone, but accompanies the two preceding ones. It is to be found in the lowland as well as right up to the limit of trees, being of all trees the one climbing highest up the mountains in these regions, and in possession of a great power of enduring cold. Not only in the lowland but also in the mountain valleys, at rather great elevations, it is seen to attain gigantic dimensions, being influenced, however, near the very limit of tree vegetation by the climatic conditions. In the mountains, the alpine variety *coronans* especially predominates, represented by low, distorted specimens, growing right up to the bare mountain. In the Sayansk district there generally does not exist any transition zone with birch-thickets between the wooded and the alpine regions. The prettiest cedar we had occasion to see during our journey, was growing in the Sayansk eruptive territory, where the soil in many places was not very fertile. The temperature here oscillates between 40° C. of heat and 50° C. of cold, the daily changes of the temperature being very considerable as well. The rainfall makes the same quantity as over great parts of Scandinavia, and it is therefore probable that this tree also is able to thrive here.

Pinus silvestris attains a height of about 35 m., measuring to about 1,5 m. in diameter. It especially occurs in sandy soil, where it frequently grows unmixed, or in many places on loamy, limy or dry and stony ground, mostly accompanied by other conifers, above all the larch.

Fig. 23. Larch forest near Ust Sisti-kem; scattered white-stemmed birches in left foreground.

Larix sibirica also assumes mighty dimensions here, measuring to 45 m. in height, and about 2 m. in diameter at a man's height. Generally the larch does not form at any rate continuous forests of considerable extent, as it occurs sparsely together with other conifers, especially with pine and foliferous trees. It seemed to be able to endure the dry steppe climate better than any other conifer, being of especially common occurrence in the dry, Devonian sandstone territories, where it also forms woods over tracts of some extent, in part even without any admixture of other trees. In such places the very largest specimens also are to be found. In the Urjankai country, the larch therefore especially occurs in the lower, hotter, and drier tracts, that is, in the wooded steppe region. However, this is not due to sensitiveness to the cold, for in northern Siberia the larch grows as far to the north as the other conifers, or farther still (up to 72½° north latitude), and even as for north as in the Jakutsk district, it becomes large and well grown. In the Urjankai country, it also reaches up to 1700—1800 m. above sea-level, i. e. right up to the tree limit. It is, accordingly, one of the most hardy conifers here, and is far from being dependent on the summer heats. The reason why it is especially restricted to lower altitudes after all, is that these regions are drier, and accordingly less suited for other conifers to do quite well. For the larch is of all the coniferous trees the one being best able to endure the dry climate, while it is evidently expelled from the moister tracts by more shade-giving conifers. Thus it is the conditions of moisture, and not the summer heats, which, in my opinion, are the cause of the existing distribution of the larch in these regions. The ground in

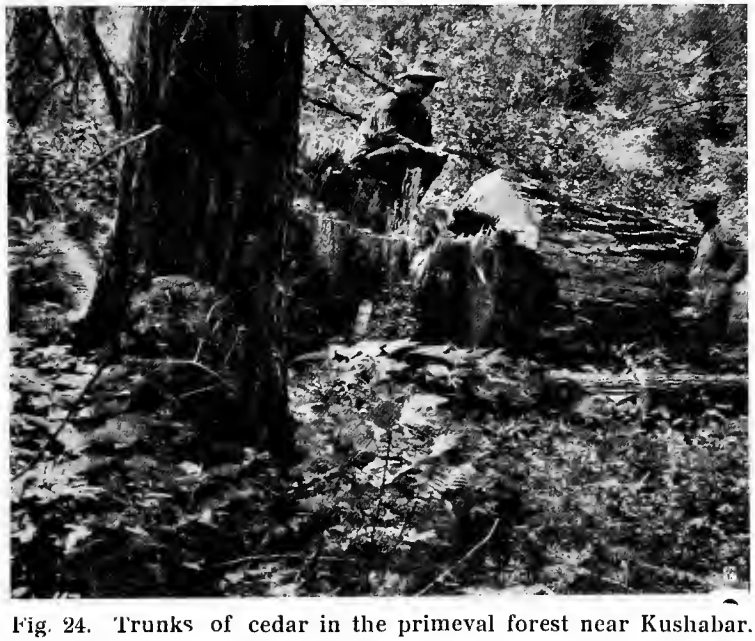

Fig. 24. Trunks of cedar in the primeval forest near Kushabar. In the foreground mainly *Sambucus racemosa*, *Asperula odorata*, and various species of ferns.

the larch wood is dry and light, without throwing any obstacles in the way of the traveller. The thin branches and narrow leaves allow the rays of the sun and the light to pass through, and in the soil, abounding in humus, formed by the leaves, which are shed yearly, there is to be found a luxuriant flora. The larch may also occur in moister places, but here, as it generally appears, more sporadically together with the spruce, the silver-fir, and the cedar. In alpine regions it ascends as high up as the tree limit, which it forms together with the cedar. The larch being thus especially distributed in dry places, it constitutes, with the birch and the aspen, the greater part of the trees to be found on the dry open wood-steppe, which form the transition zone between the taiga and the steppe region, and are covered with dry open woods with larger and smaller open steppe-like areas between them.

As mentioned before, the virgin forest begins for good at Kushabar, lying at a height of about 320 m. above sea-level. The soil here is rather sandy, forming a narrow transition zone chiefly consisting of *Pinus silvestris,* in a less degree *Larix sibirica*, and various foliferous trees, especially poplars and birches. When growing densely, the trees attain here a height of about 40 m. and even more, while in open wood the height does not generally exceed 30—40 m. but in return with somewhat thicker trunks. The scarcity of young conifers in the outskirts of the forests is noticeable, the younger generation being chiefly foliferous trees, which seems to indicate that the conifers are gradually being reduced, probably owing to the constantly increasing dryness in these regions. Later on I will return to this question. The vegetation making up the ground flora here is also still intermixed with some steppe forms. But gradually the forest of conifers

Fig. 25. From the subalpine tracts in the Sayansk district. Open moist hillside chiefly grown with *Veratrum album, Aquilegia sibirica,* and *Pedicularis resupinata.*

becomes denser and more impenetrable, the spruce, the silver-fir, and the cedar, as well as poplars and birches being predominant. In the taiga, the trees assume quite gigantic dimensions, especially the cedar, not unfrequently attaining a height of from 30 to 40 m., with a circumference of 6 to 8 m. This is the so-called black or moist taiga, characterized by an exceedingly great humidity, even in places in the immediate neighbourhood of the steppe region, and which is especially characteristically developed here on the northern sides of the mountains. The southern sides, although moist as well, are for all that somewhat drier. The moisture is kept very long, the scarce sunrays reaching down to the ground, being but little effective. In the middle of the day a sultry vapour rises from the ground, but as soon as the sun sinks a little, the moist twilight among the roots of the gigantic trees prevails again. People and horses moving onwards among the enormous trunks appear strangely diminutive amidst these surroundings. Everywhere fallen or nearly fallen trees lie scattered about pell-mell, in part overgrown, and frequently so rotten that only a thin crust has been left, through which the traveller breaks when placing his foot upon it. In the interior of the taiga, the downpour is considerable, and in winter the snow is deep, continuing till far into the summer, and, when melting, irrigating

Fig. 26. On horseback through the virgin coniferous forest under the leadership of the Sayansk mountains, about 350 m. above sea-level In the foreground chiefly *Veratrum album.*

the ground and making it swampy throughout the summer. Mosses seemed to be of no great consequence in the ground in the wood here, but in sufficiently open places there occurs a luxuriant vegetation consisting of various vascular plants, especially *Aconitum laeve, Delphinium elatum, Heracleum dissectum, Veratrum album, Aquilegia sibirica,* etc., attaining a height of towards a couple of metres and so densely interlaced as to form a nearly impenetrable jungle. This association is especially characteristic of dark and moist, partially irrigated localities, mostly in woods of *Abies sibirica.* The traveller is liable to lose the general view among this high vegetation, where men and horses nearly disappear in the tangled undergrowth when making their way with difficulty through the pathless territory. It is practically hopeless to try to force this taiga with heavily loaded pack-horses, not only because of the fallen trees and the denseness of the wood, through which men in advance are obliged to cut their way yard by yard, but especially so on account of difficulties caused by the extensive swamps and headlong declivities. The traveller forcing his way through the virgin forests in these regions, will have, above all, to take into account the natural obstacles to be met with, the real distances being rather delusive.

The usual vegetation in the taiga on the north side of the Sayansk mountains.

Here and there, open places in the wood are covered with a dense vegetation up to 1½ m. high, nearly exclusively consisting of *Veratrum album,* or elsewhere with various ferns, such as *Athyrium Filix femina, Aspidium spinulosum, Aspidium dilatatum,*

Fig. 27. Open place in the taiga near Semiretska, grown chiefly with various ferns such as *Athyrium Filix femina, Aspidium spinulosum, Onoclea Struthopteris,* and others.

Pteridium aquilinum, Onoclea Struthopteris etc. Of other species of ferns which are to be met with in the taiga, I will mention:

Cystopteris fragilis, Woodsia ilvensis subspec. alpina et *subspec. rufidula, Asplenium viride, Asplenium septentrionale, Asplenium Ruta muraria* (occurring especially on rocks)

and besides *Phegopteris Dryopteris, Phegopteris polypodioides, Polypodium vulgare, Aspidium Thelypteris,* and especially in loftier mountain tracts *Athyrium alpestre* and *Athyrium crenatum* are to be found. The clumps of aspens sometimes to be met with here, are also a characteristic association. In similar situations, the trees attain a height of towards 30 m., with slender, nearly branchless trunks, only near the summit furnished with a crown. Among the more typical plants in these localities may be mentioned above all the pretty red *Paeonia anomala,* and also *Veratrum album, Melica nutans, Daphne Mezereum, Athyrium Filix femina,* and others.

Moreover, the moist taiga on the north side of the Sayansk mountains is distinguished by a great variety of plants with an all but subarctic character, and the resemblance to the corresponding Scandinavian one was many a time quite striking. Of trees and shrubs are to be found besides *Picea obovata, Abies sibirica, Pinus silvestris,* and *Pinus Cembra var. sibirica,* constituting the bulk of the wood, sporadical specimens of *Larix sibirica,* especially on dry declivities with southern aspects, and scattered *Juniperus communis.* Of foliage trees *Betula pubescens var. ovalifolia et var. rhombifolia, Betula humilis, Populus tremula, Populus laurifolia* are predominant, more scattered and less abundantly *Sorbus Aucuparia, Prunus Padus, Alnus fruticosa, Viburnum Opulus, Sambucus racemosa, Rhamnus Frangula, Ribes nigrum, Ribes pubescens, Lonicera coerulea var. glabrescens, Salix caprea,* and *Salix viminalis* occurred. The ground in the wood here is generally very fertile, with a luxuriant and varying flora. On shady ground in woods and in copsy woods besides the plants already mentioned, I have collected and observed the following, which may give a notion of the vegetation characterizing the floor in the forest:

Epilobium montanum, Trifolium Lupinaster, Lathyrus pratensis, Viola Komarovii, Epipactis latifolia, Saxifraga crassifolia, Gnaphalium silvaticum, Cerastium pilosum, Cerastium vulgatum, Equisetum silvaticum, Pedicularis euphrasioides, Campanula rapunculoides, Pyrola uniflora, Pyrola rotundifolia var. incarnata, Senecio nemorensis var. macer, Lamium album, Antennaria dioica f. corymbosa, Geranium silvaticum et f. parviflorum, Geranium albiflorum, Geranium pseudosibiricum, Brunella vulgaris, Erigeron acer f. politus, Potentilla fruticosa, Androsaces filiformis, Pulmonaria mollissima, Asperula odorata, Polemonium coeruleum, Allium Victorialis, Melica nutans, Lathyrus Gmelini, Linnaea borealis, Stellaria Bungeana var. latifolia, Oxalis Acetosella, Trientalis europaea, Majanthemum bifolium, Circaea alpina, Stachys silvatica, Equisetum hiemale together with *Cystopteris fragilis* (especially in chinks of rocks), *Pedicularis uncinata, Pedicularis versicolor, Viola uniflora, Vicia cracca, Calamagrostis Langsdorffii, Myosotis silvatica, Anchusa myosotidiflora var. grandiflora, Paris quadrifolia, Anemone reflexa, Anemone altaica, Aconitum laeve, Actaea spicata var. erythrocarpa, Asperula odorata, Aethusa Cynapium, Corydalis bracteata, Poa nemoralis, Humulus Lupulus, Atragene sibirica, Luzula pilosa, Lysimachia vulgaris, Epilobium angustifolium, Rubus saxatilis, Rubus idaeus, Campanula rotundifolia, Hesperis matronalis var. sibirica, Pyrola*

minor, Vaccinium uliginosum subspec. imberbe nov. subspec., Vaccinium Myrtillus, Vaccinium vitis idaea, Lycopodium Selago, Lycopodium annotinum, and *Lycopodium clavatum.*

In moister grass-grown places or in *Sphagnum* swamps etc., the following plants are rather common:

Alopecurus geniculatus var. sibiricus, Angelica silvestris, Calla palustris, Parnassia palustris, Saussurea serrata, Equisetum arvense, Comarum palustre, Galium uliginosum, Myosotis palustris var. nemorosa, Carex canescens, Equisetum palustre, Cardamine macrophylla var. eriocarpa, Vaccinium Oxycoccos, Vaccinium Oxycoccos var. microcarpum, Carex pauciflora, Nasturtium palustre, Valeriana officinalis, Epilobium davuricum, Viola epipsila subspec. repens, Trollius asiaticus, Drosera rotundifolia, Drosera anglica, Drosera intermedia, Andromeda polifolia, Ledum palustre, Rubus Chamaemorus, Rubus arcticus, Typha latifolia, Carex aquatilis, Carex laevirostris, Menyanthes trifoliata, Caltha palustris, and *Sparganium minimum.*

In more open, dry places especially occurred:

Alchemilla vulgaris, Bupleurum longifolium var. aureum, Adenophora liliifolia, Trifolium pratense, Poa pratensis, and *Festuca gigantea.* On dry, open declivities with southern aspects, associated with *Betula pubescens* and *Juniperus communis,* are to be found:

Anthoxantum odoratum var. glabrescens, Carex curaica, Origanum vulgare, Solidago Virgaurea, Lotus corniculatus, Campanula glomerata, Fragaria vesca, Viola arenaria, Carum Carvi, Chelidonium majus var. grandiflorum, as well as the very characteristic *Epilobium angustifolium,* and the variety *albiflorum.*

Fig. 28. From the middle course of the Amyl river; dry hill-slope with a southern aspect towards the river.

Similar open, dry declivities with southern aspects were rather frequently to be met with in the taiga, often bearing marks of forest-fires, which had devastated the wood. In these stretches the conifers seemed to have some difficulty in gaining ground again, foliferous trees being mostly predominant, especially *Betula pubescens* and *Populus tremula*, associated with various grasses and some forerunners of the xerophilous steppe-like flora.

At greater altitudes on the summits of the still wooded hills to be found here at the outskirts of the Sayansk eruptive area, some plants not observed by me in the lower regions also occurred, viz.:

Saxifraga sibirica, Euphorbia alpina, Anemone coerulea, Ranunculus propinquus, Viola biflora, Saussurea alpina, Betula rotundifolia, Petasites frigidus, and others.

Moreover, the following are above all characteristic of the sandy stretches of the river-bed:

Dianthus superbus, Potentilla fruticosa, Potentilla anserina, and *Equisetum variegatum,* and in loamy soil *Tussilago Farfara,* and *Veronica serpyllifolia.*

In low, irrigated, stony places and on low river-banks among pebbles, the characteristic leaves of *Petasites laevigatus* frequently occurred at this time.

The taiga is practically waste, untouched and uninhabited. Only at intervals of several days' journeys, the traveller meet with scattered camps of gold-diggers where

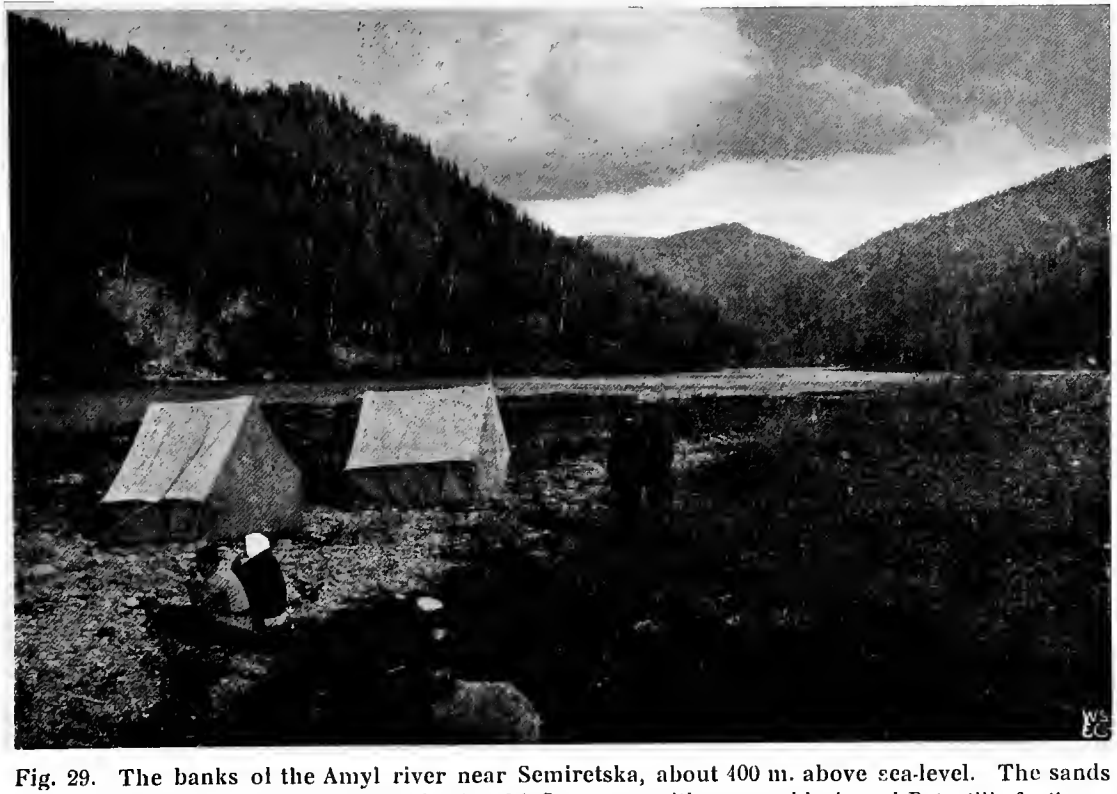

Fig. 29. The banks of the Amyl river near Semiretska, about 400 m. above sea-level. The sands covered with *Petasites laevigatus*, the banks chiefly grown with spruce, birch, and *Potentilla fruticosa.*

people are to be found, at any rate in summer. In court-yards in such places I have collected for instance:

Ranunculus repens, Urtica urens, Polygonum aviculare, Plantago major, Galeopsis Tetrahit, Euphrasia spec., Veronica arvensis, Poa annua, Trifolium repens, Brunella vulgaris, which are the most characteristic of such habitats. On the turf-roofs of the houses plants as *Poa alpina, Polygonum Convolvulus, Polygonum aviculare, Chenopodium album, Urtica urens, Stellaria media,* and *Plantago major* frequently occurred.

About half way between Kushabar and the Algiac Pass, on the river Amyl, is situated the lonely Russian settlement of Kalna. On a sloping hill, in open brushwood here, with a slightly southern aspect, near the houses, I have collected the following trees and bushes:

Picea obovata, Abies sibirica, Pinus silvestris, Betula pubescens, Sambucus racemosa, Lonicera coerulea var. glabrescens, Populus tremula, Ribes petraeum, Prunus Padus.

Fig. 30. Look-out on the upper part of the Amyl valley near Kalna, about 500 m. above sea-level. The vegetation in the foreground consisting of *Betula pubescens* and *Saxifraga crassifolia.*

Nearest to the houses the most conspicuous plants were:

Taraxacum spec., Stellaria media, Capsella bursa pastoris, Urtica dioica, Rumex domesticus, Rumex crispus, Lappa tomentosa, Antennaria dioica, Galeopsis Tetrahit, Brunella vulgaris, Poa annua, Polygonum aviculare, Geum rivale, Geum Aleppicum, Veronica arvensis, Tanacetum vulgare, Alchemilla vulgaris, Trifolium repens, Plantago major, Plantago media, Hypericum hirsutum, Stellaria graminea, Rumex Acetosella, Linaria vulgaris, Ranunculus auricomus, Valeriana officinalis, Origanum vulgare, Heracleum dissectum, Spiraea chamaedryfolia var. ulmifolia, Thalictrum minus, Trifolium pratense, Solidago Virgaurea, Aconitum laeve, Aconitum volubile, Epilobium

montanum, Epilobium angustifolium, Pyrola rotundifolia var. incarnata, Rubus idaeus, Scrophularia nodosa, Campanula glomerata, Galium boreale, Pteridium aquilinum, Platanthera bifolia, Hieracium spec., Fragaria vesca, Sagina procumbens, Majanthemum bifolium, Euphrasia hirtella, Stellaria Bungeana var. latifolia, Saxifraga crassifolia, Vaccinium vitis idaea, and *Vaccinium Myrtillus.*

In thickets of *Salix*, on declivities facing the river, there is to be found here a dense vegetation nearly of a man's height, chiefly consisting of *Calamagrostis epigeios* as the dominant plant.

Fig. 31. Hill-side near Kalna, with thicket of *Salix* and *Betula pubescens*, with a very dense and luxuriant undergrowth, chiefly consisting of *Calamagrostis epigeios*, reaching nearly the height of a man.

In its upper course, the Amyl has the character of a mountain river. The boundary between Siberia and the Urjankai country here roughly follows the watershed, which the traveller passes by this route through the Algiac Pass, the height of which is only 1413 m. above sea-level, and is accordingly situated below the limit of tree vegetation, for which reason the plants may also be spread by this way. In the main, the flora on the south side of the mountain agrees with the one on the north side; at any rate in the moist subalpine wooded regions, the flora seemed to have the same character.

Nor are the Sayansk mountains an isolated ridge, but may really be said to form a ramified mountain range, the spurs of which reach nearly to the same height as the watershed itself, both on the north and the south side of it. The greater part of the Urjankai country is traversed by these mountain masses.

From the Algiac Pass, the land slopes gradually southwards, forming, as it were, the first terrace from the Siberian lowland up towards the Mongolian tableland.

Fig. 32. Coniferous woodland in the upper Amyl valley on the north side of the Sayansk mountains, about 450 m. above sea-level.

According to our route, we went southwards along the small river Algiac to Ust Algiac, on the Sisti-kem. In the same vicinity, along the river, the wood was in many places somewhat thinner, here and there with more open stretches. Thus, there is evidently somewhat less moisture on the southern slopes of the mountains than on the north side, but quite sufficient to call into existence a complete typical subarctic vegetation on this side as well, at any rate in the more elevated regions. The dominating forest trees here were *Picea obovata, Abies sibirica, Pinus silvestris, Pinus Cembra var. sibirica, Betula humilis, Betula pubescens, Populus tremula*, and along the river thickets of *Alnus fruticosa* are especially characteristic.

Vegetation at Ust Algiac on the south side of the Sayansk mountains.

In order to convey an impression of the general composition of the vegetation in these subalpine tracts here on the south side of the mountains, I will, in the following, give an enumeration of the plants found by me in different kinds of habitats at Ust Algiac (roughly 980 m. a. s. l.).

Here are to be found under-sized spruce-forest with an admixture of clumps of foliferous trees.

In small meadows in the wood occur here:

Solidago Virgaurea, Anthoxanthum odoratum, Galatella davurica, Chrysanthemum Leucanthemum var. ircutianum, Chrysanthemum sibiricum, Brunella vulgaris, Polygonum aviculare, Urtica urens, Urtica dioica, Plantago major, Plantago media, Potentilla

Fig. 33. From the subalpine forest tracts on the south side of the Sayansk mountains near the Algiac Pass, about 1400 m. above sea-level. Glade densely grown, chiefly with *Polygonum undulatum, Veratrum album, Heracleum dissectum*, various grasses, and sedges.

anserina, Barbarea stricta, Rumex domesticus, Trifolium pratense, Trifolium repens, Trifolium Lupinaster, Gentiana verna var. angulosa, Ranunculus acris, Ranunculus repens, Geranium pratense, Alchemilla vulgaris, Erigeron acer, Hieracium umbellatum, Hypochaeris maculata, Campanula rotundifolia, Achillea Millefolium, Achillea impatiens, Dactylis glomerata, Trisetum flavescens subspec. copiosum nov. subspec., Rumex arifolius, Rumex Acetosa, Rumex crispus, Equisetum arvense, Poa annua, and *Poa alpestris.*

In open wood of foliferous trees and in thickets here chiefly consisting of *Betula pubescens, Populus tremula, Sorbus Aucuparia, Prunus Padus, Populus laurifolia, Alnus fruticosa*, and *Salix spec.*, are to be found:

Bupleurum longifolium var. aureum, Adenophora liliifolia, Adenophora denticulata, Primula elatior var. Pallasii, Senecio nemorensis var. macer, Juniperus communis, Potentilla fruticosa, Pedicularis euphrasioides, Polygonum viviparum, Polygonum undulatum subspec. alpinum, Polemonium coeruleum, Tanacetum vulgare, Spiraea chamaedryfolia var. ulmifolia, Geranium pseudosibiricum, Geranium albiflorum, Geranium silvaticum, Rubus saxatilis, Rubus idaeus, Epilobium angustifolium, Melica nutans, Veronica pseudolongifolia nov. spec., Vicia cracca, Geum Aleppicum, Artemisia vulgaris, Cacalia hastata, Galeopsis Tetrahit, Lilium Martagon var. pilosiusculum,

Cerastium vulgatum, Leuzea carthamoides, Aconitum volubile subspec. ciliare var. rectiusculum, Viola Komarovii, Anthriscus silvestris, Veratrum album, Aquilegia sibirica, Pleurospermum austriacum, Ribes petraeum, Botrychium Matricariae, Calamagrostis Langsdorffii, Antennaria dioica, Gnaphalium silvaticum, Aconitum laeve, Pyrola rotundifolia var. incarnata, Pyrola minor, Pyrola uniflora, Listera cordata, Linnaea

Fig. 34. Prospect of the Upper Algiac near the Siberian-Mongolian frontier. The tree vegetation in the background chiefly *Picea obovata, Betula pubescens,* and *Alnus fruticosa.*

borealis, Vaccinium Myrtillus, Vaccinium vitis idaea, Pedicularis uncinata, Pedicularis versicolor, Trientalis europaea, Empetrum nigrum, Calamagrostis epigeios, Lycopodium Selago f. laxum, Lycopodium annotinum, Lycopodium clavatum, Athyrium Filix femina, Phegopteris Dryopteris, Phegopteris polypodioides, Carex globularis, Carex loliacea, and *Carex tenuiflora.*

Near river-banks etc., in slightly moister habitats *Cirsium palustre, Cardamine pratensis, Myosotis palustris var. nemorosa, Pedicularis comosa, Epilobium palustre, Epilobium davuricum, Cirsium heterophyllum, Stachys palustris, Coralliorrhiza innata, Alopecurus fulvus var. sibiricus, Poa palustris, Agrostis canina, Calamagrostis neglecta, Aëra caespitosa, Equisetum palustre, Salix arbuscula, Salix myrtilloides, Ribes procumbens, Ulmaria pentapetala, Chrysosplenium alternifolium, Gnaphalium uliginosum, Angelica silvestris, Heracleum dissectum, Scirpus silvaticus, Rumex aquaticus, Polygonum Bistorta, Viola epipsila subspec. repens, Juncus filiformis, Veronica serpyllifolia, Mulgedium sibiricum, Galium trifidum subspec. distentum, Galium uliginosum, Comarum palustre, Caltha palustris, Parnassia palustris, Carex vesicaria,* and *Carex canescens* are frequent.

Moreover, in *Sphagnum* swamps and in grass-grown swamps appear:

Carex pauciflora, Carex limosa, Carex magellanica, Carex caespitosa, Vaccinium Oxycoccos, Vaccinium Oxycoccos var. microcarpum, Vaccinium uliginosum subspec.

imberbe, Rubus Chamaemorus, Rabus arcticus, Cardamine macrophylla, Ledum palustre, Drosera rotundifolia, Menyanthes trifoliata, Eriophorum vaginatum, Andromeda polifolia, Ranunculus radicans, and *Utricularia minor.*

In stony places and on dry, sloping cliffs I have collected as the most characteristic plants:

Agrimonia pilosa, Geranium Robertianum, Asplenium septentrionale, Woodsia ilvensis, and *Asplenium Ruta muraria.*

Fig. 35. Characteristic view south of the Algiac Pass near Ust Algiac. *Picea obovata* and *Betula pubescens,* with a dense ground vegetation consisting of various herbs (see text).

The vegetation about the tree limit.

Towards the limit of tree vegetation the birch is generally first seen to remain behind, soon followed by the aspen. About 100 m. below the tree limit proper, the spruce and the silver-fir also come to an end, only the cedar, the larch, and rarely, the fir reaching it. The climatic conditions, especially the moisture, seem to be the chief factors in determining which of these trees are to reach highest. In drier localities, as for instance on the Tannu-Ola, the larch seemed to be the most persevering one, the fir and above all the cedar, on the contrary, predominating in moister places, for instance in the «Altaian». The height of the tree limit seemed, for the rest, to vary even in rather neighbouring localities. It is also worth noticing that the tree limit descends eastwards from the Yenisei from a height of about 2200 m. above sea-level to about 1700 to 1800 m. above sea-level near the Algiac Pass, a characteristic trait that has not yet been accounted for. Moreover, the tree limit, of course, reaches higher on the south side of the mountains than on the north when upon level terms in other respects. In the moister parts of the Sayansk district the cedar is, as we have seen, the tree that climbs highest up on the mountains, some stunted, weather-beaten specimens reaching high up to the

bare mountain, associated with *Betula rotundifolia, Juniperus communis var. nana, Alnus fruticosa subspec. montana nov. subspec.,* forming a jungle nearly to the height of a man, and, besides, various species of *Salix.*

Fig. 36. Typical scenery from the subalpine region in the upper Amyl valley, about 1400 m. above sea-level. The trees are *Picea obovata,* with a ground vegetation chiefly consisting of *Vacciniur.*

Up here, not far from the tree limit proper, we found, indeed, the very densest coniferous forest, which it was impossible to penetrate into except with the help of axes. It was

also necessary to go ahead of the caravans to find out the easiest passages. The cedar also seemed to be more common here than lower down; in short, the character of the forest itself reminds, up here, more of the one to be found on the north side of the mountains. This may be accounted for by the greater amount of moisture on the heights here — as is the case on the north side.

A marked birch-belt above the tree limit constituting a transition zone between the coniferous forest and the bare mountain, as is to be found over the greater part of Scandinavia, was not observed by me in these regions. It is especially interesting to state this fact in connection with the phytogeographic discoveries in the extreme north and north-eastern parts of Scandinavia. For, according to the investigations of H. LINDBERG, every trace of the «birch period» is wanting here, a period characterized by birch forest mixed up with alpine types, which further to the south seemed to have been the first vegetation seizing the land left by the ice.

Fig. 37. From the «Altaian», about the tree limit at a height of about 1800 m. above sea-level. The conifers — chiefly cedar — reaching right up to the bare mountain. The birch belt is wanting. Scattered bushes of *Alnus fruticosa subspec. montana*, and *Salix*.

In the more elevated subalpine tracts about the tree limit are to be met with, besides some of the above-mentioned plants occurring in the neighbourhood of Ust Algiac, also some new ones, which seemed to be predominant here. Among plants of especially frequent occurrence may be mentioned:

Salix pyrolaefolia, Rhododendron dauricum, Corydalis pauciflora, Astragalus frigidus, Lathyrus humilis, Orobus alpestris, Chrysosplenium nudicaule, Aegopodium alpestre, Petasites frigidus, Scorzonera radiata, Pedicularis uncinata, Luzula multiflora, Lathyrus Gmelini, Saussurea alpina, Myosotis silvatica var. alpestris, Euphorbia lutescens, Aconitum ambiguum subspec. alpinum nov. comb., Calamagrostis Langsdorffii f. gracilis, Veronica sajanensis nov. spec., Cystopteris montana, Polemonium coeruleum, Trifolium Lupinaster, Spiraea chamaedryfolia, and others among the most characteristic. The traveller's eyes, however, are here perhaps above all feasted with the beautiful azure *Aquilegia glandulosa,* with its flowers to 10 cm. wide, clothing the alpine, partly stony meadows with a dense cover, visible at a great distance.

Fig. 38. *Saxifraga crassifolia L.,* from the «Altaian», near the tree limit.

Of the arbuscular vegetation about the tree limit here may be mentioned *Betula pubescens v. ovalifolia,* while *Betula humilis* only rarely seemed to reach up to the tree limit proper. Moreover, there occur here a low, alpine form of *Alnus fruticosa,* described by me as *subspec. montana,* together with *Juniperus communis var. nana,* and various species of *Salix.*

Moreover, several plants the proper range of which lies above the tree limit, also descend into this zone, such as *Betula rotundifolia, Sibbaldia procumbens,* and many

others. Near the upper limit of the forest, along brooks, in moist moss-grown places in thickets, etc. *Cortusa Matthioli* is of rather common occurrence. Moreover are to be found rather frequently here *Saxifraga crassifolia*, the splendid large-flowered *Trollius asiaticus var. stenopetala*, and *Caltha palustris*, frequently covering nearly as the sole prevailing plant large moist hill-sides in this region. In irrigated grass-fields large areas are often clad nearly exclusively with *Allium Schoenoprasum*, in full flower just at the end of July, emitting a smell of onions perceptible at a great distance. In this region there are also frequently to be found large *Sphagnum* swamps, which are now partly overgrown with:

Betula humilis, Vaccinium uliginosum subspec. imberbe nov. subspec., Carex caespitosa, Carex pauciflora, Carex canescens, Vaccinium Oxycoccos.

These magnificent regions will make an impression never to be obliterated on every lover of nature who has had the fortune to travel here.

Areas with marks after forest fires are very characteristic, especially of the lower subalpine tracts of the Urjankai country.

However, before finishing the treatment of the subalpine forest region, I must also briefly mention the extensive areas of burnt forest and various questions suggesting themselves in connection with these.

The sparse native population consisting of Soyotes, living scattered here in small clans at intervals of hundreds of wersts, are very careless about fire. They are also said designedly to fire the wood in order to procure open grazing grounds for their reindeer, in this way burning small trees and brushwood, while the larger stems are left, naked and black. In these scorched places there grows out in a short time a dense, nearly impenetrable jungle, especially of *Epilobium angustifolium*, «the fireweed» reaching the height of a man, and rather higher still. In July, the flowering season of the species, the red flowers, forming at this time a contrast to the dark wood, are visible at a distance of several miles. This plant constituted in the early years almost the only vegetation in similar places, which seemed almost to be shunned by beasts and birds. Nor are these tracts of land inviting to man, being quite empty and desolate, and very difficult to penetrate into because of the dry trunks in the course of time having been blown down in every direction or interlaced in a chaotic disorder, which renders it impossible to force a way. Forest fires are so common in the Urjankai land that a traveller will always observe some when passing through these tracts in summer. Rather frequently, mighty clouds of smoke rise above the horizon, indicative of some forest fire, now and then lasting for weeks, destroying large tracts of land without any attempt being made to put it out. Sometimes, the lightning also sets fire to the wood, which we had also occasion to see.

Burnt, open areas of this sort in the forest, larger or smaller, extending to over a great many wersts, are thus rather frequently to be met with and very characteristic of the Urjankai country. The ground is dry, and apt to catch fire, and after a burn it is long before the forest invades the ravaged places again, if ever it does so any more at all. After a forest fire the ground is, as mentioned above, rather rapidly settled by a very dense jungle of herbs, above all *Epilobium angustifolium*, which, for a great number

of years, seemed to be able to occupy the ground here, frequently nearly sole prevailing. Later on, various foliage trees also seize, especially birch and aspen, and some few others. At the same time, the character of the floor vegetation will also be changed in the process of time. Thus, the dense growth of *Epilobium* is gradually mixed up with various other herbs, such as divers grasses, *Aconitum*, *Solidago*, *Thalictrum*, *Hypochaeris*, *Pedicularis*, and the like, or it is little by little replaced by various species of ling, as *Empetrum*, *Arctostaphylos*, *Vaccinium*, etc. But even a long time after the fire has raged and all the dry trunks have been blown down and have disappeared, young coniferous forest many a time is looked for in vain, wanting as it were, strength to conquer again the ground once lost. The tall and old foliferous trees, however, testify how long time may have elapsed since the fire ravaged here. Coal and black charred trunks in the ground are an unmistakable evidence of the conflagration once devastating the forest in this place.

KRASSNOW, who visited the western portions of the Altai, the territory about B j e l u c h a, in the summer of 1882, calls attention to the fact that burnt stretches of the forest were common in those regions as well, and he, too, has noted that though it was a long time since the fire had been raging, no new forest had yet arisen, but the ground was covered with a waving sea of various herbs, several feet high. In upland regions, however, he has observed that the forest seemed to have a greater facility for reappearing. He is of opinion that the reason of this must be that eventual larch seeds entering, become suppressed by the dense herbaceous vegetation, which, in this manner, direct prevents the ecesis of the forest. Since the birch and other foliferous trees, however, seemed to be more apt to grow out again, he is of opinion that this is due to the fact that the birch with its lighter fruits, also furnished with wings, giving greater buoyancy for the promotion of the spreading, has a better chance of finding a spot open enough for its seeds to germinate and the young seedlings to develop, while the more heavy seeds of the larch will have more difficulty about this. At higher elevations, the conifers are said to enter more readily burnt areas of this sort, because the vegetation of the forest floor is supposed to be less dense here, and thus the seeds of the conifers were assumed to be more apt to find an open spot where to establish themselves. I will point out this, indicating that the suppression of the forest thus not only may be attributed to modification of the soil, as for inst. by destruction of the mould and the like.

Though, it is true, instances are known of a dense plant cover, at any rate for some time, being able to prevent the development of tree vegetation, this explanation, however, as set forth by KRASSNOW, appears rather improbable to me in this particular case, anyway when given in such a general form and concerning long periods. Even apart from the fact that also the seeds of the conifers, as is known, are furnished with wings making them adapted for wind-carriage, it is strange that none of all the millions of seeds ripening in the surrounding forest should be able to find a place — as well as those of the birch — so as to enable some plants to grow out and thereby pioneer the

way for others. But even after this dense sea of herbs, to apply KRASSNOW's own term, becoming thin and being in the course of time successively replaced by others growing less densely, the coniferous forest many times seemed not to be able to force a way still, especially at lower elevations. Here KRASSNOW's theory utterly fails to satisfy us. And why should the herbs growing out and covering the ground after a forest- fire at higher elevations be less dense than lower down? Nor did this, besides, seem to be the case at all, as the mountain sides here are just, from my experience, very luxuriant and densely grown. The supposed supersession of the forest for always by herbs in this way is also, in my opinion, the more improbable because, on the contrary, as is well-known and all experience shows, a forest cover just forms the final phase — the climax formation — in the development of the vegetation, save for places where factors as h u m i d i t y, c o l d and d r o u g h t put obstacles in the way of the generation of the trees.

The explanation of this fact that the vegetation here, in an essentially different degree, seemed to change its character, must no doubt be attributed to more deep seated causes. As we have seen, the conditions appear, as to that, to be identical both in the Altai and in the Sayansk regions. By considering this in connection with a series of other phenomena here, I have arrived at the view t h a t a t p r e s e n t a s l o w d i s p l a c e m e n t o f t h e c l i m a t i c c o n d i t i o n s t o w a r d s a d r i e r e p o c h, a n d, a s a c o n s e q u e n c e, a l s o c o r r e s p o n d i n g c h a n g e s i n t h e f l o r a l c o n d i t i o n s a r e p r o c e e d i n g i n t h e i n t e r i o r o f A s i a.

I will now enlarge upon my reasons for maintaining this view.

Conditions indicating that the climate in former times was moister in the Sayansk region.

Already when commenting on the Abakan Steppe, I mentioned the solitary larches only occurring here and there, especially near the summits of the sandstone hills in this region. I supposed these were to be considered as the last remains of the forests of the past, for roots of trees in the ground here are an irrefutable evidence that also the lower steppe proper was once wooded, which again implies a considerably moister climate at that time. I will here, for the sake of completeness, also call attention to the other evidences of a colder, at least a subarctic climate in former times, which I have found on the south Siberian steppes, more precisely mentioned on page 39. The old Tsudian tombs with their contents also prove that in times long past, the country here was inhabited by a numerous and mighty people, living, to judge from their properties left in the tombs and the rock-carvings, by farming and breeding of cattle. Their domestic animals were also, according to the rock-carvings, animals which are no longer in existence or would not now be able to stand the dryness and heat of these steppes at all. In connection with this I will also call to mind that remains after a corresponding ancient culture and colonization are recovered on the steppes south of the Sayansk mountains, in tracts which are now quite uninhabitable on account of the drought, and, accordingly, at present waste and desolate. In this connection, the great old road is highly interesting, which, to judge from the remains, existed in the western part of the Soyote Steppe, between Cha-kul and Kemchik, and was about a hundred wersts long. This road leads through

the Kemchik mountains and the steppe lying to the east of them, and it is still so well preserved that it can be availed of, even to this day, for some distances. A similar road was also observed by us between Cha-kul and the outlet of the river Kemchik. It lies for great distances along the Yenisei, where it has been built from large chips of stone on the abrupt mountain-sides on the western bank. These magnificent roads, thus running through the country in many places, attest that these tracts were once the home of a mighty and numerous people, in possession of a comparatively high culture, and that these regions, wich are now so waste and desolate, were then full of life and stir. The Soyote Steppe has, accordingly, not always been so isolated and forgotten as it is nowadays, but was once much more favourable to human thriving.

These facts, accordingly, leave beyond doubt that the climate, since the time when these ancient people lived here, must have become much drier. But herewith has not yet been proved that the climate even at this day is constantly becoming drier, or that the climate should not be supposed to be stable at all in the present day. But also in the vegetation here itself there are indications not to be mistaken. There are phenomena here showing that also at present slow changes in the vegetation are proceeding, the causes of which can only be due to climatic alterations towards a drier state.

Changes in the character of the vegetation indicating that the climate is still becoming drier.

I have, by the way, already mentioned that on the edge of the primeval forest about Kushabar, the conifers, which require more moisture, are gradually disappearing. The younger generation of the tree vegetation here especially consists of less exigent foliferous trees; and of spruce, cedar, and silver-fir, constituting the bulk of the primeval forest proper, are to be found here on the edge nearly older giants only, which must have grown out during a time more favourable to these trees in point of climate. Nowadays there is not growing out any more young forest of this sort here: to such an extent the conditions must have altered since the time when these trees were young, and among or instead of the vegetation of the coniferous forest formerly, from immemorial time, keeping the ground here alone, there now begin to invade the pioneers of the steppe species, conquering the domain about the roots of the old conifers. When at length also these last giants, which are still able to hold their own, must in their turn go to the ground, the last vestiges of the moist taiga thereby disappear for always here. In this manner the steppe seemed now little by little to push forward here into the primeval forest.

The forest is being dried up in the lowlands, and the xerophilous steppe vegetation is immigrating in turn.

Lastly, besides all these indications that climatic oscillations towards a drier time also still are taking place, I will add one trait more, which the traveller through the Urjankai country will have occasion to note: It is the areas of drying up forest. Over stretches, a larger or smaller contingent of the conifers might be quite exsiccated, with their dry and naked trunks rising, while in others the exsiccation could be seen to be in a more or less advanced stage of progress; at intervals sound trees were found, but these were in places of this sort as a rule mostly older trees only, which are best able to resist the extreme conditions, while the younger generation, which was to recruit the

stock for the future, was wanting. The fact that some of the trees occurring are still sound, and the absence of coal and charred trunks in the ground bear a clear evidence that no conflagration was the cause of the decay of the forest here. The exsiccating forest might here actually be followed in all its phases. It is a pervading trait, which I noticed everywhere, especially near the limits of the forest area, that the forest is falling into decay and disappearing over stretches where it was formerly prevalent, and this fact shows us more plainly than anything else that also at this day climatic changes are proceeding and that the forest here is doomed. It is the last desperate fight of the forest against an enemy of superior strength, the deadly drought, of which we are witnesses here. Soon its last remains vanish here, and the open, dry steppe scenery begins to prevail. Thus, there is now no stable relation in the floral conditions of these places.

These facts, which are obvious in so many places and in so many different conditions, carry evidence, in my opinion, that at present, in the interior of Asia, a climatic change towards a drier (and possibly also hotter?) time is proceeding, and hereby an acceptable explanation may also be found why the forest — especially in the lower and accordingly drier regions — has so much difficulty in invading areas again from

Fig. 39. Drying up forest near the river Tshernoretska, about 900 m. above sea-level. In the foreground natives — Soyotes — riding on their reindeer.

where it has once been expelled by conflagration. What is the chief cause of this in the present case again, if it be the drought, direct exsiccating seeds and seedlings, or others, as changes in the character of the soil, such as destruction of the mould, a reduction of the mossy cover or the like, is not always easy to settle definitely, though the drought in the summer and after-summer may be most likely direct to account for the seedlings exsiccating and being destroyed. F. E. CLEMENTS expresses his opinion on this question in his work, Plant Succession (1916) Pag. 70: «With the seedlings of woody plants the cause of the greatest destruction is drouth in midsummer or later.

Fig. 40. A view in the south side of the Sayansk mountains at an altitude of about 900 m. above sea-level. Coniferous trees in various stages of exsiccation.

This is the primary factor in limiting the ecesis of many conifers, though the «heaving» action of frost is often great or even predominant. The root-system is often inadequate to supply the water necessary to offset the high transpiration caused by conditions at the surface of the soil. Moreover, it is likewise too short to escape the progressive drying-out of the soil itself. In open places in the Rocky Mountains, such as parks, clearings, etc., the late summer mortality is excessive, often including all seedlings of the year.»

Experience shows that when the forest for some reason or other is expelled from habitats under extreme conditions, near the boundaries of its area, it does not reappear any more. During a climatic change, however, forests will be able to linger for a time

in places where they used to grow, even if the climate has changed so much that it is no longer quite favourable to the forest in this place. The flora is, on the whole, rather resistent in this respect. Thus, a floral constituent is apparently more apt to continue in such a place where it has once been growing than, under the same extreme con-

Fig. 41. Drying up forest at an altitude of about 900 m. above sea-level on the south side of the Sayansk mountains.

ditions, to invade as a new and extraneous element in the place concerned. But if the forest under such unfavourable conditions, from some cause or other, is impaired still more or entirely expelled, it has generally not strength enough to invade that place unaided. Here in Norway, where at present the tree limit is sinking, the conditions are quite analogous. Stumps of trees in the bogs are indications that the forest formerly extended much farther up, to 2—400 meters higher up the mountains, above the present tree limit, and also in many places here, dying forest is to be found towards the tree limit. Here, as well, it is often encroachments from outside, especially reckless felling of trees which has inaugurated the destruction, and has the forest so high on the mountains disappeared, it does not return. Only in one of the valleys of Norway the area of forest has, by the sinking of the tree limit within historic times, been subjected to a

reduction of roughly 20,000 km.², or nearly one third of the whole present woodland. Here the low t e m p e r a t u r e (the main temperature of the 4 summer months) draws the limit on the heights, while, in the interior of Asia, in my opinion, the d r o u g h t limits the expansion of the forest in the lowland. It is therefore, as already mentioned, especially in lower regions that the forest in the interior of Asia is apt to be dried up, and it is also in the same regions, where, according to KRASSNOW's statement, it has the greatest difficulty in invading burnt areas again. And as the forest, which has likewise been reported by KRASSNOW too, is more apt to be regenerated at higher altitudes, I consider this as a natural consequence of the greater amount of moisture, and the

Fig. 42. From the south side of the Sayansk mountains at Tshernoretska. In the background dry trunks of spruce; the sound trees are larch.

forest is, accordingly, given much better and more natural conditions of existence in these tracts. It is also really here, in the higher regions of the Sayansk, that I found the densest coniferous forest of the finest growth, as mentioned above.

Similar climatic changes of cyclical as well as of quite irregular nature, both in point of temperatures and conditions of moisture, even within, geologically speaking, comparatively short periods, are, as in known, far from being any isolated pheno-

menon. To take an obvious example, AXEL BLYTT, the Norwegian botanist, has by his studies of the peat-bogs in Norway, been able to separate 7 different zones — four layers of peat with three intervening layers of remains of forests — representing deposits after as many coresponding moist and dry periods, indicating that three drier periods of climate alternated with four moist ones since the glacial epoch. I had, unfortunately, no time or occasion for digging out in any of all the peat-bogs in which the Urjankai country abounds, and which would no doubt bring to light many interesting facts. The bogs were now frequently more or less dried up, and the original vegetation had been gradually mixed up with other plants, or, in the process of time, wholly expelled by these

Fig 43. From the lower part of the subalpine regions on the south side of the Sayansk mountains. In the background drying up conifers.

invaders, which do not belong to the typical *Sphagnum* swamps. In similar places were often to be found common copse-wood of *Betula humilis, Betula rotundifolia*, or in places, high and well grown firs and various *Salices*, and with an undergrowth of divers species of grasses and sedges, especially *Carex caespitosa*, which might form tussocks to over one meter high, *Vaccinium Myrtillus, Vaccinium vitis idaea*, and besides, also very commonly *Vaccinium uliginosum subspec. imberbe nov. subspec., Rubus arcticus,*

Carex pauciflora, Vaccinium Oxycoccos, Galium trifidum subspec. distentum nov. subspec., Comarum palustre, Ledum palustre, and others were common species in such habitats.

On the north side of the Sayansk watershed might also be found here and there naked declivities facing south, where the forest, after being ravaged by fire, had not returned, but here such areas were rare, as the tracts here were considerably moister.

That also the reindeer in some places may ruin the forest to some extent, I will not deny. But areas with dying forest is a pervading trait all over the country, even in places where the Soyotes and their reindeer never set foot, or where no trace of human activity is to be found at all. There are really only few reindeer and reindeer Soyotes in

Fig. 44. Drying up forest on the river Tshernoretska at an altitude of about 900 m. above sea-level.

the Urjankai country, and the destruction of the forest, which in this way might perhaps be brought about in this vast territory, is, in case, of quite secondary importance and at any rate only confined to smaller areas.

The question of the damage inflicted by reindeer on the forest is, for the rest, as yet quite new and pending, and far from being sufficiently cleared up, and various views assert themselves.

Some foresters are of opinion that reindeer damage the tree vegetation by nibbling off and, accordingly, destroying young plants, by rubbing their horns against rather young trees and by depriving the ground of a lichen cover, useful in certain respects, etc., while others have pointed out that reindeer promote the renewal of the forest, at any rate in tracts where the reindeer-lichen grows so densely and luxuriantly as to be able to check the renewal of the forest. As to our case, more particularly concerning burnt stretches, the reindeer-lichen must be disregarded, because, firstly, as is known, it will generally take about half a century before a reindeer-lichen cover grows out again, and, secondly, this lichen seemed, on the whole, to be of secondary importance in the forest ground of these regions.

From the observations recorded in the preceding pages, it is apparent that the forest was formerly much more widely distributed in the Sayansk tracts, and likewise, that the factors causing this forcing back of the forest are still unceasing and operative in the present times.

The grand primeval forest in the Sayansk mountains seemed by slow, but certain degrees to meet destruction, and if the climatic changes are to be continued in the same way as now, the Sayansk mountains will no doubt some day rise as naked and deforested as the Tannu-Ola now. These mountains are roughly parallel with the Sayansk mountains, and form the boundary of the Urjankai country southwards. They are a dry and woodless mountain ridge, practically destitute of forest right up to the summits, only the north side in the greatest elevations being clad here and there with small patches of wood, especially of larch, which is the tree here best able to stand the drought. The Tannu-Ola mountains are reported to average as high as the Sayansk mountains or even higher, and the fact that the Tannu-Ola is now destitute of forest, is no doubt due to the drier climate, as these regions, with prevalent northerly winds, will have to lie in the rain-shade of the Sayansk mountains.

I have not been in the Tannu-Ola myself, and have only seen these mighty mountains at a distance, from the Ulu-kem Steppe, and have, accordingly, not had occasion to search for the remains of the forests, which, formerly, in a moister period, may be supposed to have grown here.

The Alpine Region.

The alpine flora of these regions I have learnt to know from a stay in the «Altaian», a mountain mass consisting of rather high, snow-clad mountains situated in a northwesterly direction, at a distance of about 50 wersts from Ust Algiac. On this mountain the river Sisti-kem takes its rise.

The alpine vegetation is very rich and luxuriant, with many characteristic plants, especially in more sheltered places, the open mountain being poorer. Especially on declivities about the tree limit itself, the richness is many a time quite exuberant.

At greater altitudes, about 2200 m. above sea-level, the vegetation is rather monotonous, chiefly consisting of mosses and various lichens, mostly *Cladonia rangiferina*, and others of a like kind, generally not even affording sufficient food for horses.

Fig. 45. A mountain lake in the Altaian, near the sources of the Sisti-kem, about the tree limit, at an altitude of about 1800 m. above sea-level. Scattered conifers in the background; in the foreground *Betula pubescens*, *Alnus fruticosa*, *Juniperus communis var. nana*, and *Betula rotundifolia*.

In the Altaian, the mountain sides with southern aspects were rather dry and hot, frequently covered with different lichens, interspersed with some few mosses. Here large areas were seen to be entirely overgrown with the magnificent yellow-flowered *Rhododendron chrysanthum*, forming dense thickets to about 1 m. high. Moreover, in similar habitats, among lichens, were frequently to be found:

Rhododendron Anthopogon var. fragrans, Phyllodoce coerulea, Arctostaphylos alpina, Gentiana altaica, Gentiana algida, Campanula pilosa, the large flowered *Dracocephalum altaiense, Dryas octopetala, Crepis chrysantha, Empetrum nigrum,* and others.

Especially on the moist, shady, and cool declivities with northern aspects and in moist and shady valleys, the following markedly arctic species are common:

Salix glauca, Salix Turczaninowi, Salix reticulata, Salix hastata var. subalpina, Sedum Rhodiola, Cardamine belidifolia, Saxifraga sibirica var. eusibirica, Saxifraga

stellaris var. comosa, Saxifraga melaleuca, Oxygraphis glacialis, Equisetum scirpoides, Sedum quadrifidum, Valeriana capitata, Ranunculus frigidus, Oxyria reniformis, Koenigia islandica, Papaver nudicaule var. xanthopetalum, and *Moehringia lateriflora.*

Fig. 46. A view in the Altaian, above the limit of trees at an altitude of about 2000 m. above sea-level. Mostly grown with lichens and mosses with *Phyllodoce coerulea, Gentiana altaica, Gentiana algida, Viola altaica,* and others (see text).

Of other plants characterizing the alpine region here, I have collected:

Betula rotundifolia, Alnus fruticosa subspec. montana, Salix arbuscula, Salix myrsinites, Anemone narcissiflora, Callianthemum rutaefolium, Hedysarum obscurum var. lasiocarpum, Vaccinium Myrtillus, Vaccinium vitis idaea, Vaccinium vitis idaea f.

Fig. 47. Moist and cold mountain side facing north in the Altaian, at an altitude of about 2000 m. above sea-level, grown with various markedly arctic plants (see text).

pumilum, Ledum palustre var. decumbens, Andromeda polifolia, Sibbaldia procumbens, Swertia obtusa, Schultzia crinita, Saussurea Frolowii, Saussurea pygmaea, Agrostis clavata, Hierocloë alpina subspec. microstachya nov. subspec., Trisetum subspicatum, Phleum alpinum, Festuca altaica, Aëra caespitosa, Calamagrostis Langsdorffii var. gracilis, Carex rigida, Carex fuliginosa, Carex fuliginosa subspec. sajanensis nov. subspec., Carex decipiens nov. spec., Carex tristis, Carex atrata, Carex atrata var. aterrima, Poa palustris subspec. esuriens nov. subspec., Carex canescens, Carex canescens var. subloliacea, Macropodium nivale, Campanula rotundifolia var. liniifolia, Lagotis glauca var. Pallasii, Spiraea chamaedryfolia, Spiraea alpina, Euphorbia altaica Euphorbia lutescens, Pedicularis amoena, Pedicularis myriophyllum, Pedicularis versicolor, Pedicularis uncinata, Pedicularis sudetica, Pedicularis euphrasioides, Bupleurum triradiatum, Alsine arctica, Alsine biflora, Silene tenuis, Potentilla anserina, Bupleurum longifolium var. aureum, Potentilla nivea var. elongata, Potentilla gelida, Aconitum ambiguum subspec. alpinum nov. comb., Primula nivalis var. typica, Primula elatior var. Pallasii, Trientalis europaea, Parnassia palustris, Saxifraga oppositifolia, Saxifraga punctata, Saxifraga Hirculus, Saxifraga bronchialis, Saxifraga androsacea, Matricaria ambigua, Doronicum altaicum, Viola biflora, Scirpus caespitosus, Juncus triglumis, Luzula multiflora, Luzula confusa, Luzula frigida, Allium Victorialis, Epilobium anagallidifolium, Ulmaria pentapetala, Eriophorum angustifolium, Lloydia serotina, Lycopodium Selago, Lycopodium alpinum, Athyrium alpestre, and *Aspidium spinulosum.* Several of these also descend — as already mentioned — into the subalpine tracts, where they may be met with, partly as characteristic constituents of the flora of this region as well.

The vegetation here does not, in the main, reach higher than about 2200—2300 m. above sea-level, which may be regarded as the limit of the perennial snow in this tract.

The Wooded Steppe Region.

The upper part of the Sisti-kem valley is a rugged wood-land with lofty hills on both sides, mostly grown with cedar, silver-fir, spruce, and some pine, and, accordingly, in point of the flora, belonging to the subalpine region. In lower altitudes, at a greater distance from the high mountains proper, the moisture gradually decreases.

Southwards, the transitions in the natural conditions are rather sudden. The great moisture is dependent on the loftier mountain masses, which are everywhere in these regions of an eruptive nature. The Isohyetoses will no doubt prove to be closely connected with the relief of the country and in their broad features show the same course as the curves of height. The lower parts are not only drier, but the ground is also of another kind, consisting here of Devonian sandstone. Thus, both the climatic and the edaphic conditions are factors contributing towards altering the natural conditions when advancing southwards. About half way between Ust Algiac and Ust Sisti-kem

the Devonian sandstone territory appears, and the typical stamp of the taiga scenery therefore gradually disappears. The black taiga gradually retreats, and the valley becomes more open and smooth.

Southwards from here there appears a successional zonation in the vegetation from the dark, moist taiga to the dry, open steppe land. This transition zone, which is widely distributed over the Urjankai country, I have separated as the wooded steppe region. The transition between the subalpine primeval forest and the wooded steppe region may here roughly be set down at a height of about 800—850 m. above sea-level. In comparison it will be remembered that the primeval forest on the

Fig. 48. From the middle course of the Sisti-kem near Ust Algiac. The banks are grown chiefly with cedar, spruce, and also birch. About 980 m. above sea-level.

north side of the mountains might be reckoned to begin about Kushabar, at a height of only 320 m. above sea-level. The forest thus descends considerably lower on the north side. This is also an indication of an average drier climate on the south side of the mountains.

Further to the south the country becomes successively still drier, even in upland regions. Thus, the Tannu-Ola mountains, forming the boundary of the Urjankai country to the south, and being recorded to average still higher than the Sayansk mountains, are much drier, even in the more elevated tracts. Here the black or moist taiga is altogether wanting, and the ground is dry and treeless right up to the highest ridges, or only grown with scattered, open larch-forest.

This distribution of the downpour may, I think, perhaps be accounted for by the prevalent winds in these regions being mostly northern, for which reason the moisture is mainly given off on the north side of the mountains, and the wind blows down the south

side as a dry and hot one. The country further south, accordingly, lies in the rain-shade of the Sayansk mountains, and is therefore rather exsiccated. Over the Tannu-Ola, this dried up land is in connection with and continues directly into the interminable wastes and barren mountain tracts of Mongolia.

Fig. 49. From the lower part of the Sisti-kem valley. The banks grown with *Picea obovata, Prunus Padus, Sorbus Aucuparia, Ribes nigrum, Ribes pubescens, Atragene sibirica,* and *Salix.*

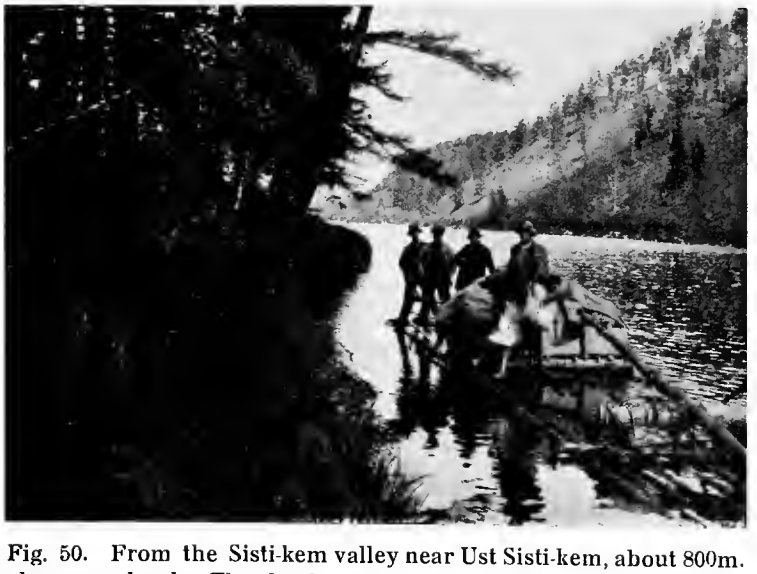

Fig. 50. From the Sisti-kem valley near Ust Sisti-kem, about 800m. above sea-level. The banks chiefly grown with larch; in the background dry declivities, with the first off-shoots of a xerophilous steppe vegetation.

Along the banks of the Sisti-kem about Tshebertash there appear larches of a lighter green, constantly increasing in number southwards, until they are seen to predominate in the Devonian territory, over large tracts of land, even mostly quite pure. The larches here are frequently large and vigorous, attaining a height of 25—30 m., measuring towards 1—2 m. in diameter at a man's height. Associated with the larch there also appear some other plants, of which may especially be mentioned:

Sedum purpureum, Gentiana Amarella, Cotoneaster melanocarpa, Scorzonera austriaca, Gentiana detonsa; Potentilla chrysantha var. asiatica, and others.

Fig. 51. From the transition zone between the taiga and the wooded steppe region. The Sisti-kem valley about 800 m. above sea-level.

Along the banks and in thickets the characteristic arbuscular plants here were represented by *Prunus Padus, Sorbus Aucuparia, Alnus fruticosa, Ribes pubescens, Ribes nigrum, Atragene sibirica,* and in sand along the river-banks *Dianthus superbus* and *Epilobium latifolium* are frequent.

The lower parts of the river basin thus chiefly contain larch-wood with smaller steppe areas. This is the genuine wood-steppes, dry open areas with scattered open larch-forest, (and sometimes pine) intermixed with various foliferous trees. Already at Ust Sisti-kem the climate is rather dry, which is also apparent from the great number of locusts to be found here. Among conifers the larch predominates, but in more

favourable situations, such as on northern slopes, there also still occur small pieces of woodland scenery consisting of spruce, silver-fir, pine, and isolated cedars. Of foliferous trees may especially be noted here:

Betula pubescens, Betula verrucosa, Alnus fruticosa, Populus tremula, Populus laurifolia, Prunus Padus, and a few others. Rather large stretches of the wood here consist nearly exclusively of larch, where the ground is light and, open and easy to pass through.

In the following I will give an enumeration of the plants found by me, representing the general character of the vegetation at Ust Sisti-kem.

In moist, grass-grown places, on river-banks and in branches of rivers, the so-called protoks, I have noted the following paludal plants as the most prominent species:

Potamogeton perfoliatus, Hippuris vulgaris, Ranunculus aquatilis, Ranunculus reptans, Ranunculus repens, Glyceria aquatica, Gnaphalium uliginosum, Nasturtium palustre, Myosotis palustris var. nemorosa, Rumex aquaticus, Lysimachia vulgaris, Mentha arvensis, Scirpus silvaticus var. Maximowiczi, Parnassia palustris, Ligularia sibirica, Caltha palustris, Galium uliginosum, Cardamine pratensis, Cardamine macrophylla, Conioselinum Fischeri, Peucedanum salinum, Saussurea serrata, Alopecurus fulvus var. sibiricus, Carex vesicaria, Carex caespitosa, Agrostis canina, Scirpus palustris, and *Equisetum Heleocharis f. fluviatile.*

In natural meadows I have collected:

Polygonum Bistorta, Geum rivale, Cirsium heterophyllum, Cirsium palustre, Cirsium arvense, Lathyrus palustris, Epilobium palustre, Stachys palustris, Spiraea salicifolia, Alectorolophus major, Alopecurus pratensis, Trifolium pratense, Trifolium Lupinaster, Trifolium repens, Rumex crispus, Tragopogon pratensis var. orientalis, Ranunculus acris, Rumex arifolius, Alchemilla vulgaris, Veronica serpyllifolia, Taraxacum spec., Phleum pratense, Euphrasia spec., Sanguisorba officinalis, Gentiana detonsa, Carum Carvi, Achillea Millefolium, Achillea impatiens, Medicago falcata, Hypochaeris maculata, Carduus crispus, Erysimum cheiranthoides, Hypericum perforatum, Galium verum, Galium boreale, Solidago Virgaurea, Erigeron acer, and *Campanula rotundifolia.*

Near the habitations of the natives occur:

Polygonum aviculare, Capsella bursa pastoris, Rumex domesticus, Trifolium repens, Poa annua, Plantago major, Plantago media, Chenopodium album, Agrostemma Githago, Galeopsis Tetrahit, Lepidium apetalum, Thlaspi arvense, Raphanus Raphanistrum, Urtica urens, and *Urtica dioica.*

Especially in thickets, woods, meadows in woods, in mixed wood, on hills, etc., are to be found:

Geranium pratense, Vicia megalotropis, Vicia cracca, Vicia amoena, Lathyrus pisiformis, Epilobium angustifolium, Epilobium montanum, Euphorbia lutescens, Tanacetum vulgare, Hypericum perforatum, Hesperis matronalis var. sibiricus, Antennaria dioica, Polemonium coeruleum, Veronica pseudolongifolia, Erythronium dens canis, Cerastium davuricum, Cerastium vulgatum, Brachypodium pinnatum,

Bromus inermis, Beckmannia eruciformis, Carex Arnelli, Ceranium pseudosibiricum, Erodium Stephanianum, Medicago platycarpa, Potentilla fruticosa, Artemisia vulgaris, Pleurospermum austriacum, Cacalia hastata, Galium vernum, Anemone silvestris, Serratula coronata, Campanula Cervicaria, Luzula campestris, Dactylis glomerata, Botrychium Matricariae, Geum Aleppicum, Lampsana communis, Rubus saxatilis, Rubus idaeus, Agrimonia pilosa, Goodyera repens, Pulmonaria mollissima, Anthriscus silvestris, Scutellaria scordiifolia, and *Ulmaria pentapetala.*

Of the typical wood flora, which has been considerably decimated, the following plants are still to be found as the last remains of the receding taiga:

Aconitum laeve, Veratrum album, Equisetum silvaticum, Actaea spicata var. erythrocarpa, Majanthemum bifolium, Trientalis europaea, Circaea alpina, Heracleum dissectum, Linnaea borealis, Pyrola minor, Pedicularis uncinata, Lycopodium clavatum, Woodsia ilvensis, and *Athyrium Filix femina.*

Of foliferous trees I have observed here at Ust Sisti-kem:

Betula pubescens, Populus tremula, Populus laurifolia, Populus nigra, Alnus fruticosa, Sorbus Aucuparia, Prunus Padus, Cornus alba, Crataegus sanguinea, Rosa acicularis, Ribes nigrum, Ribes pubescens, Lonicera coerulea var. glabrescens.

In dry, sandy woods of larch and pine are to be seen:

Draba nemorosa, Stellaria dichotoma var. heterophylla, Scorzonera austriaca, Pyrola rotundifolia var. incarnata, Androsaces septentrionale, Cotoneaster melanocarpa, Sedum purpureum, Bupleurum multinerve, Bupleurum longifolium var. aureum, Saussurea discolor, Mulgedium azureum, Hieracium umbellatum, Campanula glomerata, Zygadenus sibiricus, Rhododendron parvifolium, Ledum palustre var. angustum, Vaccinium vitis idaea, Viola arenaria, Dianthus chinensis, Gentiana verna var. angulosa, Thymus Serpyllum, Potentilla bifurca, Veronica incana, Polygonum undulatum var. alpinum, Dracocephalum Ruyschiana, Aster alpinus, Phleum Boehmeri subspec. decurtatum nov. subspec., Triticum cristatum, and *Poa altaica.*

Besides some of the plants already mentioned, the following, which are to be found here especially on dry, hot declivities and hills with southern aspects, may also be particularly noted, representing the genuine steppe flora pushing forward here:

Aconitum barbatum, Cotyledon spinosa, Sedum hybridum, Statice speciosa, Artemisia glauca, Potentilla viscosa, Potentilla chrysantha, Potentilla subacaulis, Coluria geoides. Scabiosa ochroleuca, Caragana pygmaea, and *Atraphaxis frutescens.*

This floral association, restricted by Ust Sisti-kem only to the dry and hot slopes with southern aspects, is, for the rest, gradually more widely and richly distributed farther to the south.

Proceeding farther southwards the climate becomes gradually still drier; the moist taiga, which, as already mentioned, was seen to form small forests as far as Ust Sisti-kem, practically disappears, the larch alone becoming the dominating conifer. Open, steppe-like plains are more frequent and become gradually larger, and the flora contains a constantly increasing number of steppe plants. It is interesting in these

regions to study how the vegetation of the humid taiga must gradually give way to the xerophilous steppe vegetation that advances in proportion as we get more and more south, away from the higher mountains. Owing to the broiling sun the plants were mostly dry and withered already in the middle of August when I visited these regions. About the

Fig. 52. Typical scenery from the wooded steppe region on the Upper Bei-kem, near Ust Tara-kem. The trees are birch and larch.

Kamsara, roughly 35—40 wersts south of Ust Sisti-kem, the taiga has completely disappeared, the land farther to the south consisting wholly of steppes, alternating with the open wooded steppes.

Vegetation at Ust Kamsara, about 850 m. above sea.

On the Kamsara I collected a series of plants, on the whole indicative of a considerably drier climate than farther north. On dry, open declivities the following plants, particularly belonging to the steppe region, occurred:

Caragana arborescens, Rosa pimpinellifolia, Spiraea hypericifolia, Cotoneaster melanocarpa, Dianthus chinensis, Sedum hybridum, Thymus Serpyllum, Dracocephalum nutans, Dracocephalum Ruyschiana, Phlomis tuberosa, Thermopsis lanceolata, Astragalus fruticosus, Triticum cristatum, Potentilla subacaulis, Fragaria collina, Peucedanum baicalense, Galium verum, Galatella punctata, Artemisia sacrorum, Artemisia frigida, Campanula glomerata, Origanum vulgare, Galeopsis Tetrahit, Phleum Boemeri subspec. decurtatum, Triticum caninum, Aconitum barbatum, Scabiosa ochroleuca, Cotyledon spinosa, Atraphaxis frutescens, and *Ephedra vulgaris.*

Growing especially in larch-forest:

Aster alpinus, Polygonum undulatum var. alpinum, Chamaerhodos erecta, Potentilla fruticosa, Rubus saxatilis, Solidago Virgaurea, Gentiana Amarella, Euphorbia Esula, Trisetum flavescens subpec. copiosum nov. subspec., and *Bromus inermis.*

The vegetation occurring in thickets and meadows also partly consists of plants which are characteristic of drier tracts. The following have been recorded by me as the most usual:

Fig. 53. Look-out on the wood-steppe on the Upper Bei-kem, near Ust Tara-kem. Scattered trees of larch, birch, and also some straggling spruces. The forest-ground is light and open, here and there with rather small and dry natural meadows.

Sanguisorba officinalis, Campanula rotundifolia, Thalictrum minus, Rumex arifolius, Cypripedilum macranthon, Sisymbrium Sophia, Erysimum hieraciifolium, Ranunculus acris, Alchemilla vulgaris, Hypochaeris maculata, Gentiana detonsa, Plantago media, Equisetum arvense, Alopecurus pratensis, Avena pubescens, Elymus sibiricus, Trifolium Lupinaster, Rosa acicularis, Galium boreale, Senecio nemorensis var. macer, Inula britannica, Polemonium coeruleum, Cerastium pilosum, Hypericum perforatum, Hypericum hirsutum, Geranium sibiricum, Geum Aleppicum, Rubus idaeus, Lilium Martagon, Rubus humulifolius, Epilobium angustifolium, Erigeron acer, Tanacetum vulgare, Artemisia vulgaris, Cacalia hastata, Cirsium serratuloides, Chelidonium majus var. granaiflorum, Bupleurum multinerve, Hieracium umbellatum, Pedicularis euphrasioides, Leonurus tataricus, Cypripedilum guttatum, Polygonatum officinale, Luzula campestris, Mulgedium azureum, Vicia amoena, Urtica dioica, Rumex crispus, Trientalis europaea, Linnaea borealis, Vaccinium Myrtillus, Vaccinium vitis idaea, Pyrola rotundifolia var. incarnata, Pyrola secunda, Goodyera repens, Lycopodium clavatum, Lycopodium complanatum, Equisetum silvaticum, Athyrium crenatum, Polypodium vulgare, and in slightly moister places, in grass-grown, partly irrigated fields, in bogs and on banks, etc. are to be found:

Calamagrostis neglecta, Calamagrostis Langsdorffii, Archangelica decurrens, Heracleum dissectum, Pleurospermum austriacum, Betula humilis, Vaccinium uliginosum

subspec. imberbe nov. subspec., Galium uliginosum, Valeriana officinalis, Myosotis palustris var. nemorosa, Cardamine pratensis, Comarum palustre, Ulmaria pentapetala, Epilobium palustre, Cirsium heterophyllum, Peucedanum salinum, Carex vesicaria, Poa palustris, Equisetum palustris, Petasites laevigatus, Lysimachia thyrsiflora, and *Salix myrtilloides.*

It will be seen that only a very small number of the plants mentioned here are wholly dependent on the wood itself, the flora usually associated with the coniferous wood having shrunk even more in this tract.

South of the Kamsara, upwards along the river Bei-kem, the moist taiga, and the plant life associated with it, has wholly disappeared. The smaller stretches of wood to be

Fig. 54. Open, dry larch-forest with scattered birches and poplars between the rivers Kamsara and Ii. In the foreground mostly *Thalictrum, Viburnum,* and various grasses.

found here are entirely made up of larch and various foliferous trees, the greater part of the land consisting of open wood-steppes, interspersed with smaller areas with a marked and genuine steppe scenery. Only along the rivers there occur some other conifers, such as spruce and fir, but they do not form woods here and are not accompanied by any vegetation characteristic of coniferous forests.

The traveller is no longer under the necessity of availing himself of pack-horses, and in spite of the total absence of roads, carts may everywhere be employed, the land being so open in every direction. The densest larch-wood is to be found near the river Kamsara. For the rest, the land is rather hilly, with immense terminal moraines, and sand terraces. A great number of lakes are also to be found here, mostly due to deposits from earlier glaciers. Among the lakes may be mentioned the pretty Todshi-kul[1]), the sacred lake of the Soyotes, which no stranger is allowed to approach.

[1]) Kul = lake, Todshi-kul, i. e. the lake of the Todshi tribe.

The Bei-kem flows here in some places between high cliffs of sandstone or through an alluvial plain, through which it has dug out a bed between high, sandy, terraced banks, where the river erodes. In other places where the valley is more open and broad, the river has formed large, flat, moist or even quite swampy flood-plains. Similar moist flood-plains occur near Ust Tara-kem, and on the Dora Steppe at PETROW and MOSGALEWSKI. These swamps are here densely overgrown with vascular plants and contain an exceedingly rich flora of algae, described by me in an earlier publication.

Fig. 55. From the Upper Bei-kem, near the Dora Steppe. The banks grown chiefly with larch and birch. In the background dry and scorched slopes of Devonian sandstone.

In this region the Bei-kem valley lies at a height of from 800—940 m. above sea-level. The alluvial sand terraces, with a nearly park-like appearance, being large and level with scattered larches, contain, besides some of the above-mentioned plants frequently occurring in larch-wood, also *Leontopodium alpinum var. sibiricum*, being a very common and characteristic constituent of the flora, as for instance on the wide sand terraces about the river Ii. In wood constisting of larch, *Betula pubescens*, and *Populus tremula*, the ground is found over large stretches to be grown with *Polygonum undulatum*

var. alpinum, which is very common and characteristic in similar localities. In the following I shall give a summary of the plants I met with at Ust Tara-kem in order to illustrate the composition of the vegetation of these regions. In the larch-forest and on the wood-steppes, the following species of plants, giving their stamp to the scenery, are common:

Fig. 56. Look-out on swampy land at the Dora Steppe, near the sacred lake Todshi-kul. The declivities in the foreground are grown with *Lychnis sibirica, Sedum hybridum, Artemisia sacrorum, Artemisia laciniata,* and various grasses; the swamps with *Potamogeton natans, Polygonum amphibium, Butomus umbellatus, Scirpus Tabernaemontani,* and various sedges. In the background the Bei-kem is seen.

Vegetation at Ust Tara-kem, about 880 m. above sea-level.

Aconitum barbatum, Draba nemorosa, Galium boreale, Galium verum, Scabiosa ochroleuca, Achillea Millefolium, Achillea impatiens, Aster alpinus, Pyrola rotundifolia var. incarnata, Triticum cristatum, Phleum Boehmeri, Polygonum undulatum var. alpinum, Leontopodium alpinum, Medicago platycarpa, Lathyrus pisiformis, Chamaerhodos erecta, Potentilla fruticosa, Rubus saxatilis, Rosa acicularis, Sedum purpureum, Bupleurum multinerve, Solidago Virgaurea, Hypochaeris maculata, Campanula glomerata, Gentiana Amarella, Bromus inermis, and *Brachypodium pinnatum.*

On dry, open steppes and on rocky slopes occur:

Thalictrum petaloideum, Arabis incarnata, Alyssum lenense, Silene repens, Lychnis sibirica, Sedum hybridum, Gentiana decumbens, Sisymbrium heteromallum, Ephedra vulgaris, Cotyledon spinosa, Atraphaxis frutescens, Hedysarum polymorphum, Potentilla chrysantha, Potentilla subacaulis, Fragaria collina, Agrimonia pilosa, Peucedanum baicalense, Galatella punctata, Artemisia sacrorum, Artemisia laciniata, Cirsium acaule, and *Dracocephalum nutans.*

On the flood-plains are to be found, besides natural meadows, a more or less dense brush-wood consisting of:

Populus laurifolia, Populus tremula, Alnus fruticosa, Ribes nigrum, Ribes pubescens, Sorbus Aucuparia, Prunus Padus, Betula humilis, Betula pubescens, Salix depressa, and others, and where the ground is drier, scattered larches occurred. Farthest away from the river the flood-plain is rather dry, containing a series of plants, such as:

Cerastium vulgatum, Hypericum hirsutum, Geranium pseudosibiricum, Vicia amoena, Vicia megalotropis, Vicia cracca, Geum Aleppicum, Potentilla bifurca, Potentilla viscosa, Rubus idaeus, Epilobium angustifolium, Peucedanum vaginatum, Anthriscus silvestris, Erigeron acer, Artemisia macrantha, Cacalia hastata, Carduus crispus, Dactylis glomerata, Aëra caespitosa, Serratula coronata, Campanula rotundifolia, and *Pedicularis euphrasioides.*

Moreover, I have found on these flood-plains:

Sanguisorba officinalis, Sisymbrium Sophia, Urtica dioica, Polygonum aviculare, Lathyrus palustris, Ranunculus acris, Cardamine pratensis, Alchemilla vulgaris, Heracleum dissectum, Halenia sibirica, Rumex crispus, Rumex arifolius, Gymnadenia conopsea, Pleurogyne rotata, Pedicularis resupinata, Bupleurum multinerve, Trifolium Lupinaster, Onobrychis sativa, and nearer to the river, where it is moister and partly swampy, occurred:

Fig. 57. From the wooded steppe region, near the Dora Steppe. The declivities facing south, which are exposed to the burning of the sun's rays, are partly stripped of forests.

Impatiens noli tangere, Saussurea serrata, Rumex aquaticus, Ranunculus sceleratus, Nasturtium palustre, Galium trifidum, Lysimachia thyrsiflora, Potentilla fragarioides, Mentha arvensis, Comarum palustre, Spiraea salicifolia, Ulmaria pentapetala, Epilobium palustre, Cicuta virosa, Cenolophium Fischeri, Peucedanum salinum, Cirsium heterophyllum,

Carex curaica, Pedicularis palustris, Stachys palustris, Triglochin palustre, Juncus filiformis, Scirpus silvaticus, Phalaris arundinacea, Elymus sibiricus, Alopecurus fulvus var. sibiricus, Calamagrostis neglecta, Poa palustris, Glyceria aquatica, Equisetum Heleocharis, and *Equisetum scirpoides*, and in stagnant water, in swamps, pools and small lakes were to be found:

Nymphaea pygmaea, Hippuris vulgaris, Callitriche verna, Utricularia minor, Limnanthemum nymphoides, Polygonum amphibium, Potamogeton natans, Potamogeton perfoliatus, Potamogeton pusillus, Menyanthes trifoliata, Myriophytlum verticillatum, Alisma Plantago, Sagittaria sagittaefolia, Butomus umbellatus var. minor, Acorus Calamus, Scirpus Tabernaemontani, Carex vesicaria, and *Carex ampullacea.*

Among sand and loose stones on the banks are to be found *Dianthus superbus* and *Petasites laevigatus.* One of the most characteristic plants here, on grass-grown river-banks, was furthermore the tall *Elymus giganteus.*

As the last remains of the real wood flora are to be found in some places, accompanying *Picea obovata* and *Pinus silvestris*, plants such as:

Linnaea borealis, Equisetum silvaticum, Athyrium crenatum, Phegopteris polypodioides, Vaccinium Myrtillus, Vaccinium vitis idaea, Goodyera repens, Gnaphalium silvaticum.

Fig. 58. Typical scenery near the Dora Steppe; slopes facing south are dry and barren, those facing north are grown with larch. In the background some huts are seen — the so-called yurts — belonging to the natives.

Thus, leaving the loftier regions in the mountains, the natural conditions of the land are seen to change gradually southwards from the characteristic and genuine taiga about Ust Algiac into the lower, wooded steppe region about the Upper Bei-kem on the Dora Steppe, with a more distinct central Asiatic stamp.

The direct distance between the two said places is not more than about 150 to 200 wersts, but the difference as to natural conditions is very considerable. The Dora

Steppe, with the dwellings of PETROW and MOSGALEWSKI, formed the utmost limit of the expedition by this route, no further progress south-eastwards being made.

In spring these steppes and wood-steppes here are said to be covered with a luxuriant grass vegetation, which is gradually destroyed by the drought in the course of the summer. In the second half of August these tracts had already an autumnal appearance, the first nights of frost having also in a great measure ruined the vegetation. Just in this transition zone between the steppe and the taiga, the best and richest regions of the land, from a cultural standpoint, are to be found, and it is strange that this rich and beautiful country should be so thinly populated. The area of the Urjankai land probably exceeds 150,000 wersts², of which, as mentioned already, at least one third is

Fig. 59. A view in the Dora Steppe. In some places the steppe is nearly destitute of vegetation, and being exposed to the erosion of the violent winds there are often formed stretches of drift-sand. In the right background larches.

arable, but with a population scarcely amounting to 20,000 individuals, living scattered about in deep valleys and dense woods, where no foreign traveller hitherto has been able to search them out. For this reason it is also, as a matter of course, quite impossible to state the exact number of the inhabitants.

For our homeward journey from the Dora Steppe we had to choose between two routes, the one lying across the Amyl taiga, followed by us when entering the land, and the other by water down the Bei-kem. In spite of the latter route being the longer, it was chosen as having the charm of novelty.

The Bei-kem runs here at an average speed of 16 wersts an hour, and in the course of one day we descended in this way from the Dora Steppe to Ust Sisti-kem. The bottom of the valley is situated at a height of between 950 m. and 850 m. above sea-level. At some distance below Ust Sisti-kem the Bei-kem receives an affluent called the Sebi.

From the Dora Steppe roughly down to Sebi the ground consists in the main of reddish-brown Devonian tile and conglomerates of the same kind as on the Minusinsk Steppe. As mentioned above, the strata of this Devonian formation here is interrupted by one of the spurs of the Sayansk mountain range, the so-called Tashkyl and Artool mountains, running in a south-easterly direction from the main ridge. This mountain range is a very important boundary line, forming a natural barrier between the upper and the lower Yenisei basins. These two parts also differ distinctly in point of natural conditions, the south-western part being very dry, approaching much as to climate and general aspect the whole of the Mongolian steppes.

Fig. 60. Look-out on the Dora Steppe with the Buddhistic temple — the Kuree of the Soyotes — forming the extreme limit of the progress of the expedition south-eastwards.

The Bei-kem valley between Sebi and Tapsa.

Towards the region where the river runs into these mountains, the strata of the Devonian formation become more and more displaced, with fine folds in the profile along the river. In several places they are seen to have been broken up entirely or raised on edge. Below Sebi, the eruptive zone itself begins, continuing roughly as far as Ujuk. The average breadth of the mountain range here is 60 wersts, the Bei-kem running all this way in foaming white rapids in deep, narrow clefts, with steep, rocky walls on both sides, reaching right up to the regions of the perennial snow. The roar of the mighty river, averaging here 20 wersts an hour, is echoed from the surrounding mountains, and the lonely travellers feel oppressed by the gloomy, wild and mighty scenery. During our journey here we had also heavy torrents of rain, with hazy weather, contributing to make it still more wild and adventurous. At the mouth of the Utt, mighty green porphyrities are seen extending down towards Utinski porog, followed downwards successively by gneisses, granites, diabases, and melaphyres, whereupon porphyrities again appear. The mountain range here has the same character as the Sayansk

range itself, some of the snow-clad peaks attaining a height of to 2500 m. This branch is followed by the moist taiga, where I observed once more the common, typical Sayansk subalpine taiga vegetation. Besides the plants already mentioned, I have collected here among gravel and stones *Astragalus alpinus, Astragalus frigidus, Euphorbia lutescens, Agrostis canina,* and various species of *Calamagrostis.* On moist, moss-grown declivities close by the river, I have, in addition, collected *Ribes petraeum* and *Sedum populifolium,* and in grass-grown places near the river *Ranunculus acris var. pumilus.* In places,

Fig. 61. From the Yenisei valley about Sebi, where we enter the eruptive zone in the Tashkyl and Artool mountains — and where the primeval forest begins.

Fig. 62. From the Bei-kem valley, near Utinski porog. Naked, sandy and gravelly river-bank below the highwater mark.

currant- and black-currant bushes were seen, strangely enough, to cover nearly exclusively the mountain sides, thousands of bushes forming, as it were, one continuous garden.

About Ujuk there occur small quantities of Devonian sandstone forced into the eruptives, and farther down the Soyote Steppe the Devonian sandstone is nearly sole prevailing again. Towards Ujuk the mountains become lower and more rounded; the primeval forest — the moist taiga — gradually retreats again, and the wood becomes more open and lighter, with an admixture of larches and various foliage trees bearing an unmistakable evidence of a drier climate. In this region it is very interesting to study the

Fig. 63. From the Bei-kem valley, near Utinski porog. The wood on the right side has been ravaged by forest-fire.

steppe and the taiga fighting for the upper hand. Gradually the larch-forest with its attending flora becomes nearly sole prevailing on the drier and warmer southern slopes, while the taiga proper is now only to be found on the cooler and moister northern slopes. But here, too, it is also at first by degrees mixed up with and later on altogether replaced by the larch, whereby the last remains of the moist taiga, which were to be found in the tracts between Sebi and Ujuk, have disappeared. Here we find ourselves once more in a transition zone, which, as to floristic conditions, is to be referred to the wooded steppes. But soon it also becomes too dry for the larch: it begins thinning, at first on declivities with a southern aspect, and is here slowly but surely forced to yield for the benefit of a more xerophilous vegetation pressing forward, so as to constitute a completely woodless and pure steppe scenery here. Thus, the southern

slopes have now become quite treeless, and the ground here is occupied by a dry and stiff steppe grass, while for the larch, for some lenght of time, there is still a place of retreat on the northern declivities. As the general direction of the river in these tracts is just north-south, (see map II) and the folds in the landscape through which the river bursts, are parallel with the mountain range, i. e. east-west, the traveller going by the river will see a scenery of a very strange character. For when looking southwards here, the cool, wooded slopes facing north may be seen in front, and the whole country looks wood-clad. On the other hand, if the traveller runs his eye northwards, in the direction of the slopes facing south, the country looks naked, dry and scorched, having the character of a perfect steppe. The boundaries between the forest and the steppe

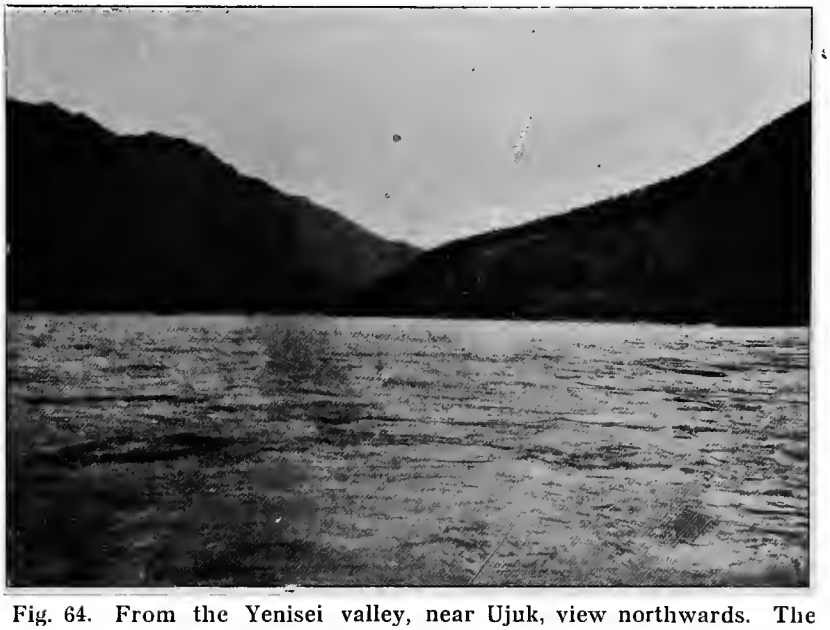

Fig. 64. From the Yenisei valley, near Ujuk, view northwards. The banks on the left side of the photograph facing south and south-west, and being exposed to the burning rays of the sun, are completely treeless, while the declivities facing north on the opposite banks are grown with larch-forest.

vegetation follows the hill-tops rather accurately. But the dryness always increasing soon expels the larch altogether, being thinned and disappearing also on the declivities facing north; thus, the country here gradually passes into a completely treeless territory, where the steppe scenery prevails. The air is mild and dry, and from the river may be heard the grating music of the numerous grass-hoppers from the steppes. Within an amazingly short distance the scenery has changed its character from moist, dark taiga into dry, scorched steppe. When going downstream, the traveller passes the whole transition zone showing the seral development of the flora in the course of few hours. The last remainder of forest disappears between Ujuk and Tapsa.

The most fertile stretches are also to be found here in the transition zone between the moist taiga and the hot steppe. The first attempts at agriculture were seen to have been made already at Sebi, but the crops are very uncertain on account of the short summer, nights of frost occurring, even in the lowland, already in August. Rye, however, is said to ripen here generally, while wheat mostly fails, being destroyed by the early nights of frost. At Tapsa a rich and interested Russian, SAFIANOW by name, has built a lonely summer-residence, where potatoes, cucumbers, water-melons, tomatoes and other vegetables, besides oats, wheat, barley, and millet were grown to perfection.

However, the climate is so dry that artificial irrigation is required. Along the river Cha-kul, about 300 wersts further to the west, there are also small patches of cultivated ground to be met with, where chiefly millet, rye, and some wheat are sown, but in these places also the crops are eminently dependent on artificial irrigation. In dry summers, when the sources of the Cha-kul happen to be dried up, and no water is to be found for artificial watering, this agriculture utterly fails.

The Lower Steppe Area about the Ulu-kem.

A short distance below Tapsa the Bei-kem receives a very considerable tributary, the Xa-kem, or Chua-kem, and under the name of the Ulu-kem the united rivers flow westwards through a very rugged but rather, low-lying and completely woodless rocky land, with a typical steppe vegetation, the scenery here in some places even having the appearance of a real desert. This is the large Soyote Steppe, about the Ulu-kem, extending about 300 wersts westwards along the river to the Kemchik region, and northwards to the Sayansk mountains in about 52° N. L., passing to the south through the Tannu-Ola direct into the vast steppes and deserts of Mongolia. The Tannu-Ola mountains differ widely from the Sayansk mountains in character, forming really one large ridge, running in a west-easterly direction from the Kemchik region. On this ridge are to be found several rounded peaks averaging about 2650 m. above sea-level. The passes between them are generally about 200 m. lower and easily passable, the more so as the Tannu-Ola mountains are for a great part woodless. In several places the ground is so plain that the traveller is even enabled to avail himself of carts. The Tannu-Ola differs from the Sayansk, however, not only in shape and climate but partly also in the flora and fauna, the steppe scenery being more prevalent here.

The steppes about the Ulu-kem are not real plains, but form a very rugged landscape, a rock-steppe with barren, steep acclivities, larger alluvial plains occurring here and there, only along the river. The rocky ground chiefly consists of Devonian sandstone, in many places exposed in mighty profiles along the river. Especially in the most western part towards Cha-kul, a series of eruptives have broken up, their light, frequently nearly white colours contrasting nicely with the monotonous brownish-red landscape. The height of the river-bed above sea-level sinks over this distance of roughly 300 wersts from about 760 m. at Tapsa down to about 560 m. at Cha-kul and Kemchik.

The climate is very dry and hot down here, and in this respect there is a great difference between this arid Soyote Steppe and the more elevated and humid mountain valleys in the north-eastern portions of the land. From the steppes here on the Ulu-kem may frequently in summer be observed heavy thunder-storms and torrents of rain

Fig. 65. Scenery from the steppes about the Ulu-kem. The land is dry and desert-like, with a nearly complete absence of vegetation. On the alluvial plain in the foreground are seen some yurts belonging to the natives.

Fig. 66. Rock-steppe, dry and naked, about the Ulu-kem.

to the north, apparently following the mountains, without touching the inner dry basin. The summers are very hot, with temperatures regularly rising to + 40° C. in the daytime, while, in winter the temperature sinks to ÷ 30 or 35° C., and, as a rare exception,

still lower. As far south as Uliassutai there has been recorded the low temperature of ÷ 47,5° C. The weather is mostly rather calm, the prevalent northerly and north-westerly winds being considerably softened down on the south side of the Sayansk mountains. The Ulu-kem becomes free from ice in the middle of April, and is not frozen up till the end of October.

These tracts correspond, if anything, to WARMING'S r o c k - s t e p p e s, and have only a very poor and monotonous flora. There are only a few species which are able to find reasonable terms in these extremely dry and hot localities. The rocky ground

Fig. 67. From the Soyote Steppe on the Ulu-kem. A sacred «ova» belonging to the natives, built chiefly of *Salix*, *Populus*, and *Caragana*.

frequently lies bare, and the shallow, sandy earth occurring here, is dry as tinder and very poor in organic matter. The sun bakes all day from the cloudless sky, and several weeks, perhaps even months may pass without any rain falling. On the other hand, there is a rich dew-fall at night, which is no doubt of great consequence for the plant life in these regions.

On account of the far advanced season when I visited these regions, at the end of August, the steppe was mostly dry and scorched, the summer heat having almost entirely destroyed the vegetation, and only few plants were left at this time. As our journey for various reasons had to be be forced through these tracts, my floristic

researches have become rather defective. In the most western parts of the steppe, the flowering season occurs already in April, and further to the east only in May, however, in contradistinction to the north-eastern part of the land, where the flowering begins as late as in June and July.

At Tapsa (roughly 760 m. above sea-level), at this time of the year, I have observed the following rather characteristic plants:

Tribulus terrestris, Medicago lupulina, Coluria geoides, Odontites rubra, Lotus corniculatus, Astragalus melilotoides, Veronica pinnata, Leonurus tataricus, Bromus inermis, Elymus dasystachys, Elymus junceus, Urtica dioica, and of shrubs:

Fig. 68. From the river Ulu-kem. Nearly naked declivities stretching towards the river; only the banks and the islets grown with straggling trees.

Cotoneaster melanocarpa, Caragana arborescens, Caragana spinosa, and along the river:

Alnus fruticosa, Populus nigra, Populus laurifolia, Populus tremula, Salix spec. and some others are seldom absent. On sandy ground in the river, I have collected *Salix viminalis* and *Cuscuta lupuliformis.* Farther up the river, *Caragana jubata* also occurs as a very characteristic plant of this region.

At Bjelosarsk, in thickets and in grass-grown places near the river, I have observed:

Lathyrus pratensis, Galium boreale, Inula britannica, Inula salicina, Adenophora marsupiiflora, Hemerocalis flava, Melilotus dentatus, Potentilla bifurca, Potentilla fruticosa, Potentilla viscosa, Potentilla flagellaris, and in dry places, such as steppe-meadows, on declivities, etc. occur *Sisymbrium officinale, Glycyrrhiza uralensis, Panzeria lanata, Stipa pennata var. Joannis, Caragana pygmaea, Caragana Bungei, Chamaerhodos erecta, Serratula nitida var. glauca, Statice speciosa, Urtica cannabina,* and *Gypsophila Gmelini.*

In moist meadows, I have, moreover, found here *Cenolophium Fischeri.* Of the earlier vegetation at this time only remains were left.

Fig. 69. Typical scenery from the steppes about the Ulu-kem. Shrub-steppe, with *Stipa* and scattered bushes of *Caragana Bungei,* and *Caragana spinosa.* To the left a branch of the river, with thicket of *Salix.*

Further westwards the mighty river flows calmly through a completely woodless land, only the banks and the islets in the river being clad with shrubs and trees, consisting of various species of *Salix, Betula verrucosa,* and here and there some isolated *Larix.* Among the other trees, for the rest, to be found here may be mentioned:

Populus tremula, Populus laurifolia, Populus nigra, Alnus fruticosa, Crataegus sanguinea, and *Cornus alba.*

Here are to be met with in many places the typical s h r u b - s t e p p e s, being intermediate between the genuine steppe and the xerophile copse. These shrub-steppes constitute a plant society characteristic of the rocky steppes in central and south-western Asia, and are of very common occurrence on the steppes along the Ulu-kem. Here the

shrub-steppes are nearly exclusively composed of *Caragana Bungei, Caragana spinosa*, and *Potentilla fruticosa*, forming low bushes, about 1 m. high, at rather regular intervals, and so open that they do not form any continuous thicket, with a sparing vegetation between them, frequently of *Stipa pennata var. Joannis, Stipa capillata, Stipa sibirica*, and remains of other grass vegetation.

But the flora of the steppe itself is very poor and monotonous. At this time, in the last days of August and the beginning of September, the greater part of the plant life had been destroyed, partly by the long continued summer drought, partly by the nights of

Fig. 70. The Yenisei valley below Kemchik-bom. The dry rock-steppe gradually disappears, and the primeval forest begins. On the banks the first larches are seen.

frost. Over large stretches there was an almost complete absence of vegetation. Besides the plants already mentioned above, I have, here and there, on the steppe along the Ulu-kem, collected still determinable remains of various plants, which, for the sake of completeness, I will give in the following, viz:

Linum perenne, Astragalus hypoglottis var. dasyglottis, Astragalus melilotoides, Cotyledon spinosa, Oxytropis aciphylla, Artemisia dracunculus, Convolvulus Ammani, Eurotia ceratoides, Güldenstädtia monophylla, Ephedra vulgaris, Atraphaxis frutescens, Caragana pygmaea, Allium senescens, Carex supina, Koeleria gracilis, Triticum cristatum, Artemisia latifolia, Artemisia glauca, Medicago falcata, Gypsophila desertorum, Echinospermum Lappula, Panzeria lanata, Iris ensata, Allium Stellerianum, Selaginella

sanguinolenta, and *Cirsium acaule,* here and there *Caragana arborescens* and *Vicia costata;* near the bank of the river are sometimes to be found:

Melilotus albus, Melilotus dentatus, Potentilla anserina, Convolvulus arvensis, Myricaria davurica, and *Asparagus Pallasi nov. nom.*

In places where the saliferous soil has stamped the scenery, are to be found such plants as:

Oxytropis glabra, Statice Gmelini, Plantago Cornuti, Plantago maritima subspec. ciliata nov. subspec., Salicornia herbacea, and *Lepidium latifolium.*

Fig. 71. Woodland in the Yenisei valley, as seen from the river, near Bolshoi porog.

At Kemchik-bom the mountains begin to increase in height again, and the traveller once more gets into one of the spurs of the Šayansk mountains, through which the river breaks. Here the Ulu-kem receives the Kemchik river, a comparatively small tributary, with a very large but rather dry basin. On the banks here I have found, besides the above-mentioned foliferous trees, also *Hippophäe rhamnoides,* and moreover:

Beckmannia eruciformis, Solanum Dulcamara var. persicum, and on cliffs above the river *Eragrostis minor* occur.

About Kemchik, where the river runs at a great rate through narrow clefts, its main direction is changed from east and west, flowing for the rest of its long course in a northerly direction towards the Arctic Ocean. The surrounding mountains, which

are completely barren, rise abruptly from the river, the steppe scenery still predominating till at some distance below Kemchik, where the taiga again begins to appear. In the usual way the larch is the pioneer tree, gradually followed by the pine, cedar, and spruce, till, at some distance above the river Uss, the genuine black taiga becomes predominant. The breadth of the Sayansk mountains is here about 400 or 500 wersts, over which distance the altitude of the river decreases from 570 to 300 m. From Kemchikbom, forming the boundary between Mongolia and Siberia, the river flows under the name of the Yenisei through the taiga in a rather narrow valley, with many rapids. This mountain ridge, which the river bursts through here, is accompanied by the common Sayansk taiga vegetation.

Below Mainski porog, the mountains become lower; the river widens to many times its former breadth, assuming the imposing appearance which it keeps northwards throughout the lowland. The transition between the taiga and the steppe is also here very sudden. About Mainski porog, the forest rather suddenly disappears, and the traveller presently sails out of the mountains into open, level plains, affording a wide view in all directions. The air is also felt to become milder. Small villages surrounded by cultivated fields are met with at shorter intervals; the traveller is back again on the historic steppes about Minusinsk.

Enumeration of the Vascular Plants Observed in the Regions Traversed.

Pteridophyta COHN.

Polypodiaceae MARTIUS.

Woodsia ilvensis (L.) R. Br. in Transact. Linn. Soc. Lond. XI (1812) p. 173; Ledeb. Fl. Alt. IV, p. 330; Turczan. Cat. Baical. no. 1354; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 559. Ledeb. Fl. Ross. IV, p. 510; Turczan. Fl. Baical.-Dahur. (1856, I) p. 77, no. 1386; Luerss. Farnpflanz. p. 507. *Acrostichum ilvense* L. Spec. Pl. ed. II (1763) p. 1528.

subspec. **rufidula** (Koch) Aschers. et Graebn. Synops. Mitteleur. Fl. I (1913) p. 69; Крыл. Фл. Алт. VII (1914) p. 1775.

Rather common in the subalpine tracts of wood about the Upper Amyl and on the Sisti-kem, on dry, open hill-sides facing south.

subspec. **alpina** (Bolton) Aschers. et Graebn. Synops. Mitteleur. Fl. I (1913) p. 71; Крыл. l. c. p. 1775. *Woodsia hyperborea* R. Br. l. c. p. 173; Turczan. Cat. Baical. no. 1355; Ledeb. Fl. Ross. IV, p. 511.

Only one specimen of this one occurs in my collection, found in the Amyl valley, near the Algiac Pass, in the middle of July. The specimen is sterile.

Distribution: The species is spread over Europe, northern and central Asia to northern Mongolia and eastern Asia, North America, Greenland.

Cystopteris fragilis (L.) Bernh. in Schrad. Neuem Journ. I (1806) p. 26; Ledeb. Fl. Ross. IV, p. 516; Turczan. Fl. Baical.-Dahur. (1856, I) p. 85, no. 1399; Luerss. Farnpflanz. p. 449; Крыл. Фл. Алт. VII (1914) p. 1778. *Polypodium fragile* L. Spec. Pl. ed. II (1763) p. 1553. *Aspidium fragile* Swartz, Syn. Fil. p. 58; Ledeb. Fl. Alt. IV, p. 329; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 958; Turczan. Cat. Baical. no. 1353.

Common on rocks in shady taiga about the Upper Amyl, at Semiretska and Kalna as well as on the Upper Sisti-kem. With young sporangia in the middle of July.

Distribution: Europe, northern and central Russia, northern and western Asia to Persia, Afghanistan, Turkestan, the Himalayas, northern Mongolia, East Asia, North and South America, Greenland, North Africa, Australia and neighbouring islands.

Cystopteris montana (Lam.) Bernh. in Schrad. Neuem Journ. I (1806) p. 26; Ledeb. Fl. Ross. IV, p. 517; Luerss. Farnpflanz. p. 468; Крыл. Фл. Алт. VII (1914) p. 1780.

In the Altaian, in somewhat moist places, in subalpine coniferous woodlands.

Distribution: Europe, northern and central Asia, North America.

Onoclea Struthopteris (L.) Hoffm. Deutsch. Fl. (1795) p. 12; Swartz, Syn. Fil. p. 111; Luerss. Farnpflanz. p. 482. *Struthiopteris germanica* Willd. Spec. Pl. V (1810) p. 288; Ledeb. Fl. Alt. IV, p. 325; Turczan. Cat. Baical. no. 1343; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 955; Ledeb. Fl. Ross. IV, p. 527; Turczan. Fl. Baical.-Dahur. (1856, I) p. 79, no. 1388. *Osmunda Struthiopteris* L. Spec. Pl. ed. II (1763) p. 1523. *Matteuccia Struthiopteris* (L.) Todaro, Крыл. Фл. Алт. VII (1914) p. 1782.

Common on wet, wooded mountain-sides at Kushabar and in the taiga about the river Amyl, on the Sisti-kem as well as the Bei-kem. Observed with sporangia in July and August.

Distribution: Europe, Siberia, eastern Asia, Sakhalin, Japan, North America.

Aspidium Thelypteris Swartz in Schrad. Journ. Bot. 2 (1800) p. 40; Luerss. Farnpflanz. p. 360. *Acrostichum Thelypteris* L. Spec. Pl. ed. II (1763) p. 1528. *Polystichum Thelypteris* Roth, Tent. Fl. Germ. 3, p. 7; Ledeb. Fl. Ross. IV, p. 513. *Dryopteris Thelipteris* (L.) A. Gray, Man. (1848) p. 630; Крыл. Фл. Алт. VII (1914) p. 1785.

Along the borders of *Sphagnum*-marshes, and in swampy woods in several places in the Amyl valley, between Kushabar and the Algiac Pass.

Distribution: Europe, excepting the extreme northern and southern portions, Siberia, south-western and central Asia, northern Mongolia, eastern Asia, Japan, Africa, North America, New Zealand.

Aspidium spinulosum Swartz in Schrad. Journ. Bot. 2 (1800) p. 38. Luerss. Farnpflanz. p. 429. *Polystichum spinulosum* D. C. Fl. Franc. II (1805) p. 561; Ledeb. Fl. Ross. IV, p. 515; Turczan. Fl. Baical.-Dahur. (1856, I) p. 84, no. 1398. *Dryopteris spinulosa* (Müll.) O. Ktze, Rev. Gen. Pl. II (1891) p. 813; Крыл. Фл. Алт. VII (1914) p. 1790.

Rather common in pine-wood about the river Amyl, and in several places on the Sisti-kem, accompanying the following:

subspec. **dilatatum** Smith, Fl. Brit. 3 (1804) p. 1125; Aschers. et Graebn. Synops. Mitteleur. Fl. I (1913) p. 59; Крыл. Фл. Алт. VII (1914) p. 1791.

In shady coniferous wood on the Amyl and the Upper Sisti-kem, in the Altaian, where observed by me on the mountains up to the limit of conifers. Collected here with sporangia at the end of July.

Distribution: The species is distributed over the greater part of Europe, Asia Minor, Siberia, northern Mongolia, the Himalayas, eastern Asia, Sakhalin, Japan, North America, Greenland.

Phegopteris Dryopteris (L.) Fèe, Gen. Fil. (1850—52) p. 243; Luerss. Farnpflanz. p. 300. *Dryopteris Linnaeana* Christens. Ind. Filic. (1905) p. 275; Крыл. Фл. Алт. VII (1914) p. 1792. *Polypodium Dryopteris* L. Spec. Pl. ed. II (1763) p. 1555; Ledeb. Fl.

Alt. IV, p. 325; Turczan. Cat. Baical. no. 1341; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 954; Ledeb. Fl. Ross. IV, p. 509; Turczan. Fl. Baical.-Dahur. (1856, I) p. 76, no. 1384.

Pretty common in shady taiga along the Amyl.

Distribution: Europe, except the extreme south-east, Asia Minor, Siberia, northern Mongolia, the Himalayas, eastern Asia, Sakhalin, Japan, Greenland, North America.

Phegopteris polypodioides Fèe, Gen. Fil. (1850—52) p. 243; Luerss. Farnpflanz. p. 296. *Polypodium Phegopteris* L. Spec. Pl. ed. II (1763) p. 1550; Ledeb. Fl. Alt. IV, p. 325; Turczan. Cat. Baical. no. 1342; Ledeb. Fl. Ross. IV, p. 508; Turczan. Fl. Baical.-Dahur. (1856, I) p. 76, no. 1383. *Dryopteris Phegopteris* Christens. Ind. Filic. (1905) p. 284; Крыл. Фл. Алт. VII (1914) p. 1794.

Scattered in shady coniferous forest at Kushabar, Kalna as well as on the Upper Bei-kem, near Mosgalewski.

Distribution: Europe to the Pyrenees, Asia Minor, Siberia, central and eastern Asia, Sakhalin, Japan, North America, Greenland.

Athyrium Filix femina (L.) Roth, Tent. Fl. Germ. III, p. 65; Christens. Ind. Filic. p. 142; Luerss. Farnpflanz. p. 133; Крыл. Фл. Алт. VII (1914) p. 1798. *Asplenium Filix femina* (L.) Bernh. in Schrad. Neuem Journ. I (1806) p. 27; Ledeb. Fl. Alt. IV, p. 327; Turczan. Cat. Baical. no. 1348; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 956; Ledeb. Fl. Ross. IV, p. 518; Turczan. Fl. Baical.-Dahur.(1856, I) p. 81, no. 1392. *Polypodium Filix femina* L. Spec. Pl. ed. II (1763) p. 1551.

Rather common in somewhat moist habitats, in brush-wood and wood over the traversed tracts of the Sayansk district, between Kushabar and Petropawlowsk. Semiretska, Kalna, the Algiac Pass, Ust Algiac and the Upper Sisti-kem, where ascending to about 1800 m. above sea, on the Kamsara, and by Utinski porog.

Distribution: Europe, Siberia, central and eastern Asia, Sakhalin, Japan, India, the East Indies, Algiers, Madeira, the Azores. North and South America.

Athyrium alpestre Rylands in Moore Ferns Gr. Brit. and Ir. Nat. Pr. Pl. VII, (1857) p. 1; Christens. Ind. Filic. p. 139; Luerss. Farnpflanz. p. 143; Крыл. Фл. Алт. VII (1914) p. 1800. *Polypodium rhaeticum* L. Spec. Pl. ed. II (1763) p. 1552 ex parte; Ledeb. Fl. Ross. IV, p. 510.

Rather common in the Altaian, in somewhat wet places, among stones, along rivulets etc., above the limit of trees, at an altitude of from 1800 to 2000 m. above sea-level. Collected with young sporangia at the end of July.

Distribution: Europe, the Caucasus, north-western portion of Asia Minor, Siberia, Northern Mongolia.

Athyrium crenatum (Sommerf.) Rupr. in Nyland. Spicil. Fl. Fen. II (1844) p. 14, et in Beitr. z. Pflanzenk. d. Russ. R. III, p. 40; Christens. Ind. Filic. p. 140; Крыл. Фл. Алт. VII (1914) p. 1801. *Aspidium crenatum* Sommerf. in Act. Holm. (1834) p. 104.

Asplenium crenatum Fries, Summa Veget. Scandinav. p. 82. 253; Ledeb. Fl. Ross. IV, p. 518; Turczan. Fl. Baical.-Dahur. (1856, I) p. 80, no. 1391. *Asplenium sibiricum* Turczan. Cat. Baical. no. 1347.

On stony ground, in shady pine-wood, on the Upper Sisti-kem, on the Kamsara, and near the Dora Steppe. Observed with sporangia at the end of July.

Distribution: Northern Europe, Siberia, northern Mongolia, eastern Asia, Sakhalin.

Asplenum septentrionale (L.) Hoffm. Deutschl. Fl. II (1795) p. 12; Ledeb. Fl. Alt. IV, p. 327; Ledeb. Fl. Ross. IV, p. 521; Luerss. Farnpflanz. p. 209; Крыл. Фл. Алт. VII. (1914) p. 1803. *Acrostichum septentrionale* L. Spec. Pl. ed. II (1763) p. 1524.

In dry chinks of rocks facing south, rather common near Ust Algiac. With sporangia in July.

Distribution: Europe, Asia Minor, Siberia, western and central Asia, North Africa, North America.

Asplenum viride Huds. Fl. Angl. ed. I (1762) p. 385; Ledeb. Fl. Ross. IV, p. 521; Luerss. Farnpflanz. p. 159; Крыл. Фл. Алт. VII (1914) p. 1805.

Among loose stones in chinks of rocks, near the banks of the Amyl and the Upper Sisti-kem, in somewhat moist, subalpine coniferous forest.

Distribution: Europe, western and central Asia, Siberia, North America.

Asplenum Ruta muraria L. Spec. Pl. ed. II (1763) p. 1541; Ledeb. Fl. Alt. IV, p. 327; Ledeb. Fl. Ross. IV, p. 520; Luerss. Farnpflanz. p. 218; Turczan. Cat. Baical. no. 1349; Turczan. Fl. Baical.-Dahur. (1856, I) p. 81, no. 1393; Крыл. Фл. Алт. VII (1914) p. 1805.

In chinks of dry, hot rocks in the Amyl valley, near Semiretska, and near Ust Algiac, on the Sisti-kem.

Distribution: Europe, Siberia, western and central Asia, Japan, North Africa, North America.

Pteridium aquilinum (L.) Kuhn, Botan. v. Ost-Afr. (1879) p. 11; Christens. Ind. Filic. p. 591; Luerss. Farnpflanz. p. 104; Крыл. Фл. Алт. VII (1914) p. 1810. *Pteris aquilina* L. Spec. Pl. ed. II (1763) p. 1533; Ledeb. Fl. Alt. IV, p. 326; Turczan. Cat. Baical. no. 1345; Ledeb. Fl. Ross. IV, p. 524; Turczan. Fl. Baical.-Dahur. (1856, I) p. 80, no. 1390.

Rather common in the traversed regions. In meadows in woods, near Kushabar; rather common in subalpine, open coniferous forest in the Altaian, at Ust Algiac, at Ust Sisti-kem, in open fir-and larch-wood, accompanying *Anemone silvestris, Lilium Martagon, Geranium,* etc. With spores in July and August.

Distribution: Occurs nearly all over the globe, except in the arctic and arid tracts, and in temperate portions of South America.

Polypodium vulgare L. Spec. Pl. ed. II (1763) p. 1544; Ledeb. Fl. Alt. IV, p. 324; Turczan. Cat. Baikal. no. 1340; Ledeb. Fl. Ross. IV, p. 508; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 953; Turczan. Fl. Baical.-Dahur. (1856, I) p. 75, no. 1382; Luerss. Farnpflanz. p. 53; Крыл. Фл. Алт. VII (1914) p. 1812.

On a rocky wall in the Amyl taiga, near Kalna, and on the Kamsara. With nearly ripe spores in the middle of July.

Distribution: In the northern frigid zone, over the greater part of Europe, Siberia, western, central, and eastern Asia, Africa, the Canary Islands, the Azores, Madeira, North America, Kerguelen, and the Sandwich Islands.

Ophioglossaceae R. Br.

Botrychium Matricariae Spreng. Syst. Veget. IV, p. 23; Крыл. Фл. Алт. VII (1914) p. 1766. *Botrychium matricarioides* (Wild.) Fries, Novit. Fl. Svec. ed. II, p. 288; Turczan. Cat. Baical. no. 1339; Ledeb. Fl. Ross. IV, p. 505; Turczan. Fl. Baical.-Dahur. (1856, I) p. 86, no. 1401. *Botrychium rutaefolium* A. Br. in Koch, Syn. ed. 2. p. 972; Luerss. Farnpflanz. p. 582.

In pastures, and moss-grown fields, in open woods of conifers and foliferous trees, near Ust Algiac and Ust Sisti-kem.

Distribution: Europe, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North and South America, Australia.

Equisetaceae C. Rich.

Equisetum arvense L. Spec. Pl. ed. II (1763) p. 1516; Ledeb. Fl. Alt. IV, p. 320; Turczan. Cat. Baical. no. 1360; Ledeb. Fl. Ross. IV, p. 486; Turczan. Fl. Baical.-Dahur. (1856, I) p. 67, no. 1366; Luerss. Farnpflanz. p. 687; Крыл. Фл. Алт. VII (1914) p. 1751.

In moist fields on the Yenisei, near Ust Abakansk. Only the barren stems gathered at the beginning of June; in meadows at Ust Kamsara, in August.

subspec. **alpina** Wahlenb. Fl. Lapp. p. 296; Luerss. l. c.

Near the Algiac Pass, in subalpine woodlands. Sterile.

subspec. **erecta** Klinge, Arch. Nat. Liv. Ehst. u. Curland. 2. ser. VIII (1882) p. 372; Luerss. l. c.

On moist and muddy ground, on the borders of an islet in the Yenisei. Gathered sterile at the beginning of June.

Distribution: The species is spread over Europe, Siberia, western, central and eastern Asia, Sakhalin, Japan, North America, Greenland, Africa.

Equisetum pratense Ehrh. Beitr. III, p. 77; Ledeb. Fl. Ross. IV, p. 488; Turczan. Fl. Baical.-Dahur. (1856, I) p. 68, no. 1368; Luerss. Farnpflanz. p. 660; Крыл. Фл. Алт. VII (1914) p. 1753. *Equisetum umbrosum* Meyer in Willd. Enum. Pl. H. Berol. p. 1065; Ledeb. Fl. Alt. IV, p. 331.

In moist places in brush-wood, on the margins of bogs, and the like, between Minusinsk and Kushabar.

Distribution: Europe, Siberia, Sakhalin, the Amoor Province, Manchooria, North America.

Equisetum silvaticum L. Spec. Pl. ed. II (1763) p. 1516; Ledeb. Fl. Alt. IV, p. 321; Turczan. Cat. Baical. no. 1357; Ledeb. Fl. Ross. IV, p. 487; Turczan. Fl. Baical.-Dahur. (1856, I) p. 67, no. 1367; Luerss. Farnpflanz. p. 648; Крыл. Фл. Алт. VII (1914) p. 1754.

Dispersed in somewhat moist, frequently moss-grown places in forests of conifers and foliferous trees in the Amyl valley, at Ust Algiac, near the Kamsara, and in the woods between the dwellings of Kokus and Mosgalewski.

Distribution: Europe, Siberia, eastern Asia, northern Mongolia, North America, Greenland.

Equisetum palustre L. Spec. Pl. ed. II (1763) p. 1516; Turczan. Cat. Baical. no. 1356; Ledeb. Fl. Ross. IV, p. 488; Luerss. Farnpflanz. p. 704; Turczan. Fl. Baical.-Dahur. (1856, I) p. 68, no. 1369; Крыл. Фл. Алт. VII (1914) p. 1756.

Dispersed in moist places, frequently on *Sphagnum*-bogs, and the like, in the subalpine woodlands between Kushabar and Ust Algiac, and in swamps near Ust Kamsara. Most of the specimens gathered belong to *f. simplicissimum* A. Br. in Sillim. Amer. Journ. XLVI (1844) p. 85, distinguished by completely branchless stems. Specimens are also occasionally to be found the stems of which have short branches, only a few cm. long *var. verticillatum* Milde *f. breviramosum* Klinge, Arch. Nat. Liv. Ehst. u. Curland 2. ser. VIII, p. 401.

There occur numerous intermediate forms between the above-mentioned ones. The sporangia ripen at the beginning of July.

Distribution: Europe, western Asia, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North America.

Equisetum Heleocharis Ehrh. Hannov. Mag. 1783, p. 286; Крыл. Фл. Алт. VII (1914) p. 1757. *Equisetum limosum* L. Spec. Pl. ed. II (1763) p. 1517; Ledeb. Fl. Alt. IV, p. 322; Turczan. Cat. Baical. no. 1359; Ledeb. Fl. Ross. IV, p. 489; Turczan. Fl. Baical.-Dahur. (1856, I) p. 69, no. 1370; Luerss. Farnpflanz.p. 715.

f. fluviatile Aschers. Fl. Brand. 1, p. 900. Rather common in muddy places along the Yenisei and the river Abakan, where the spores seem to ripen in the second half of June. I have also gathered it on the banks of the Sisti-kem and on the Bei-kem, near the mouth of the Tara-kem.

f. limosum Aschers. Fl. Brand. 1, p. 900. In swampy places on the banks of the Yenisei, near Ust Abakansk, and on the borders of a small lake in an islet in the Yenisei, between Minusinsk and Ust Abakansk. A very short form, with stems only about 10 cm. high, gathered by me in muddy places on the river Abakan, near Askys, with nearly ripe spores in the second half of June.

Distribution: Europe, Siberia, northern Mongolia, eastern Asia, Japan, Sakhalin, North America.

Equisetum hiemale L. Fl. Lapp. (1737) p. 311, et. Spec. Pl. ed. II (1763) p. 1517; Ledeb. Fl. Alt. IV, p. 322; Turczan. Cat. Baical. no. 1358; Ledeb. Fl. Ross. IV, p. 490; Turczan. Fl. Baical.-Dahur. (1856, I), p. 69, no. 1371; Luerss. Farnpflanz. p. 734; Крыл. Фл. Алт VII (1914) p. 1760.

Here and there in moist, shady taiga, between Kuhabar and Petropawlowsk; in the Altaian, on the borders of a small lake in the forest, about the limit of tree vegetation.

Distribution: Europe, except the extreme south-west, western Asia, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North America.

Equisetum variegatum Schleich. Cat. Pl. Helvet. ed. II (1807) p. 27; Ledeb. Fl. Ross. IV, p. 490; Turczan. Fl. Baical.-Dahur. (1856, I) p. 70, no. 1372; Luerss. Farnpflanz. p. 765; Крыл. Фл. Алт. VII (1914) p. 1761.

In the subalpine regions, on sandy banks of rivers, on the Upper Amyl.

Distribution: Artic Islands Europe, except the extreme south-west, Siberia, northern Mongolia, North America, Greenland.

Equisetum scirpoides Michaux, Fl. Bor. Amer. II (1803) p. 281; Ledeb. Fl. Ross. IV, p. 491; Luerss. Farnpflanz. p. 779; Крыл. Фл. Алт. VII (1914) p. 1762.

A few specimens of this species gathered by me in the Altaian, in moist, sandy, and gravelly places, on the banks of a brooklet above the limit of tree vegetation, at a height of towards 2000 m. above sea-level, and also in moist places near Ust Tara-kem.

Distribution: Arctic Islands, northern Europe, Siberia, northern Mongolia, Sakhalin, North America, Greenland.

Lycopodiaceae R. Rich.

Lycopodium Selago L. Spec. Pl. ed. II (1763) p. 1565; Ledeb. Fl. Alt. IV, p. 323; Turczan. Cat. Baical. no. 1368; Ledeb. Fl. Ross. IV, p. 496; Turczan. Fl. Baical.-Dahur. (1856, I) p. 71, no. 1373; Luerss. Farnpflanz. p. 788; Крыл. Фл. Алт. VII (1914) p. 1742.

Rather common in the Altaian, where met with right up to the belt of lichens. With sporangia at the end of July.

Distribution: Arctic Islands, Europe, except the extreme south-western portions, western Asia, Siberia, northern Mongolia, Sakhalin, Japan, North and South America, Madeira, the Azores, St. Helena, Tasmania, New-Zealand.

Lycopodium annotinum L. Spec. Pl. ed. II (1763) p. 1566; Turczan. Cat. Baical. no. 1364; Ledeb. Fl. Ross. IV, p. 497; Turczan. Fl. Baical.-Dahur. (1856, I) p. 71, no. 1374; Luerss. Farnpflanz. p. 809; Крыл. Фл. Алт. VII (1914) p. 1743.

Rather frequent in coniferous forest in the Urjankai land, Ust Algiac, Tshernoretska, in several places on the rivers Sisti-kem, Bei-kem, and Kamsara.

Distribution: The greater part of Europe, Siberia, northern Mongolia, central and eastern Asia, Sakhalin, North America, Greenland.

Lycopodium clavatum L. Spec. Pl. ed. II (1763) p. 1564; Ledeb. Fl. Ross. p. 499; Turczan. Fl. Baical.-Dahur. (1856, I) p. 72, no. 1377; Luerss. Farnpflanz. p. 818; Крыл. Фл. Алт. VII (1914) p. 1745.

Rather common in the Urjankai land, in coniferous forest, occasionally accompanying the preceding one.

Distribution: Europe, Siberia, central and eastern Asia, Sakhalin, Japan, India, America, Greenland, Africa, New Holland.

Lycopodium complanatum L. Spec. Pl. ed. II (1763) p. 1567; Turczan. Cat. Baical. no. 1362; Ledeb. Fl. Ross. IV, p. 499; Turczan. Fl. Baical.-Dahur. (1856, I) p. 72, no. 1376; Luerss. Farnpflanz. p. 822.

subspec. **anceps** Wallr. Linnaea XII (1840) p. 676; Luerss. l. c. p. 824; Крыл. Фл. Алт. VII (1914) p. 1746.

Scattered in rather dry places in coniferous forests, especially of larch and fir, about the Lower Sisti-kem, the Kamsara, and about the Dora Steppe.

Distribution: Europe, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, the East Indies, North America, Madeira.

Lycopodium alpinum L. Spec. Pl. ed. II (1763) p. 1367; Ledeb. Fl. Alt. IV, p. 323; Turczan. Cat. Baical. no. 1363; Ledeb. Fl. Ross. IV, p. 498; Turczan. Fl. Baical.-Dahur. (1856, I) p. 72, no. 1375; Luerss. Farnpflanz. p. 838; Крыл. Фл. Алт. VII (1914) p. 1747.

Rather common in the Altaian, above the limit of tree vegetation, among moss and lichens. Specimens with young sporangia gathered at the end of July.

Distribution: Mountain tracts of Europe, western Asia and Siberia, northern Mongolia, Japan, North America, Greenland.

Selaginellaceae Metten.

Selaginella sanguinolenta (L.) Spring. Monogr. de Lycop. II, p. 57; Turczan. Cat. Baical. no. 1366; Ledeb. Fl. Ross. IV, p. 501; Turczan. Fl. Baical.-Dahur. (1856, I) p. 73, no. 1379. *Lycopodium sanguinolenta* L. Spec. Pl. ed. II (1763) p. 1567.

On mountain slopes in the Altaian, and on the rock-steppe about the Ulu-kem.

Distribution: Afghanistan, southern Siberia and northern Mongolia, Kamtchatka, and northern China.

Gnetaceae LINDLEY.

Ephedra vulgaris Richard, Comm. Conif. Cyc. (1826) p. 26; C. A. Mey. Monogr. d. Gatt. *Ephedra* (1846) p. 270; Ledeb. Fl. Ross. III, p. 663; Крыл. Фл. Алт. VII (1914) p. 1737. *E. monostachya* L. Spec. Pl. ed. II (1763) p. 1472; Ledeb. Fl. Alt. IV, p. 300; Karel. et. Kiril. Enum. Pl. Fl. Alt. no. 827; Turczan. Cat. Baical. no. 1077. *E. monosperma* Gmel. ex Amm. Ruth. p. 178, no. 255; Turczan. Fl. Baical.-Dahur. (1854, II) p. 421, no. 1078. *E. distachya* L. Spec. Pl. ed. II (1763) p. 1472.

Scattered on the Abakan Steppe, especially on dry, hot, sloping Devonian cliffs of sandstone, most frequently in chinks facing south, collected with flowers in the middle of June at Ust Kamuishto and Askys, where accompanying *Atraphaxis frutescens*. Gathered on rocky places, near the banks of the Ulu-kem, on the rock-steppes, at a short distance above Cha-kul, with ripe fruits at the beginning of September. Occurring here together with *Güldenstädtia monophylla*.

Distribution: Southern Europe, Persia, Trans Caspia, Turkestan, Siberia, northern Mongolia, central Asia, North Africa.

Pinaceae LINDLEY.

Juniperus communis L. Spec. Pl. ed. II (1763) p. 1470; Turczan. Cat. Baical. no. 1073; Ledeb. Fl. Ross. III, p. 684; Turczan. Fl. Baical.-Dahur. (1854, II) p. 417, no. 1072; Крыл. Фл. Алт. VII (1914) p. 1732.

Dispersed in the Amyl taiga, south of the Algiac Pass, and on the Sisti-kem.

Distribution: Europe, Siberia, northern Mongolia, western and central Asia, North America, Greenland, North Africa.

subspec. **nana** (Willd.) Loud. Arb. Frut. Brit. (1838) p. 2486; Крыл. l. c.; *Juniperus nana* Willd. Spec. Pl. IV (1805) p. 854; Ledeb. Fl. Alt. IV, p. 299; Turczan. Cat. Baical. no. 1074; Karel. et. Kiril. Enum. Pl. Fl. Alt. no. 826; Ledeb. Fl. Ross. III, p. 683; Turczan. l. c. p. 418, no. 1073.

Dispersed in the Altaian, where to be found below as well as above the limit of tree vegetation, right up to the lichen belt.

Distribution: Europe, Siberia, northern Mongolia, western and central Asia, North America, Greenland, North Africa.

Juniperus Pseudosabina Fisch. et. Mey. Animadvers. Botan. ad. Indic. VIII, Sem. H. Petropol. p. 15; Ledeb. Fl. Ross. III, p. 682; Turczan. Fl. Baical.-Dahur. (1854, II) p. 419, no. 1076; Крыл. Фл. Алт. VII (1914) p. 1736. *J. Sabina* L. Spec. Pl. ed. II (1763) p. 1472 ex parte; Ledeb. Fl. Alt. IV, p. 298; Turczan. Cat. Baical. no. 825.

This species growing in nature not found by myself, but fresh branches I have met with, more than once, among the natives, the so-called Soyotes, at Tshernoretska, as well

as on the Dora Steppe. Made use of during their religious ceremonies, and said to occur on the mountains near by.

Distribution: Eastern portions of Siberia, and north-western Mongolia.

Pinus silvestris L. Spec. Pl. ed. II (1763) p. 1418; Ledeb. Fl. Alt. IV, p. 199; Turczan. Cat. Baical. no. 1068; Ledeb. Fl. Ross. III, p. 674; Turczan. Fl. Baical.-Dahur. (1854, II) p. 415, no. 1071; Крыл. Фл. Алт. VII (1914) p. 1727.

Rather common in the region explored. Preferring dry, rather sandy ground, frequently forming woods on the extensive moraines, be it unmingled, or accompanying various foliferous trees, particularly the asp and birch, or — as is the case at Ust Sistikem and on the Dora Steppe — accompanying the larch. Not observed by me anywhere ascending very high up the mountains. Reaching up to 1100 m. above sea-level, near Ust Algiac. Rather common in sandy places on the steppes about Minusinsk.

Distribution: Northern and middle Europe, northern Asia, Siberia, northern Mongolia, the Amoor Province, Manchooria.

Pinus Cembra L. Spec. Pl. ed. II (1763) p. 1419; Ledeb. Fl. Alt. IV, p. 200; Turczan. Cat. Baical. no. 1070; Karel. et. Kiril. Enum. Pl. Fl. Alt. no. 823; Ledeb. Fl. Ross. III, p. 673; Turczan. Fl. Baical.-Dahur. (1854, II) p. 414, no. 1070.

subspec. **sibirica** Rupr. in Fl. Boreali-Uralensis (1856) p. 43; Крыл. Фл. Алт. VII (1914) p. 1724. *Pinus sibirica* Mayr, Fremdländische Wald- und Parkbäume für Europa (1906) p. 388.

Very common in the wood region of the territory traversed, from Kushabar and further southwards, preferring moist, or even nearly swampy places. Rarely to be found in dry situations. Not observed anywhere by me forming woods, but dispersed in woods of *Abies sibirica* and *Picea obovata*, or accompanying various foliferous trees, especially *Populus laurifolia*, *Populus tremula*, the birch, etc. These trees, with their large bushy crowns rising higher than the wood standing around, give the scenery a wild and ragged appearance. Trees belonging to this species may attain gigantic dimensions. In the moist taiga between Kushabar and Petropawlowsk, I rather frequently met with trees towards 2 m. in diameter, and over 30 m. high. (See Fig. 19, 22, and 24). On the mountains, at any rate in moister places, it ascends higher up than any other conifer, reaching in the Altaian up to 1700 or 1800 m. above sea-level. In similar situations the trees are lower, with tortous and twisted trunks, shorter leaves, and smaller, broadly ovate cones, to 7 cm. long *var. coronans* Litw. Горный сибирскій кедръ-въ Труд. Ботан. Муз. Императ. Акад. Наукъ. T. XI (1913) p. 20—26.

The seeds of this species are roasted by the natives, and extensively used for food. This tree is called «keder» — cedar — by the Russians, a name also used by me in this publication, in spite of its being no genuine cedar.

Distribution: Northern and eastern Russia, Siberia, northern Mongolia.

Larix sibirica Ledeb. Fl. Alt. IV, p. 204; Karel. et. Kiril. Enum. Pl. Fl. Alt. no. 824; Крыл. Фл. Алт. VII (1914) p. 1721. *Larix decidua* Mill. *var. sibirica* Korshinsky, Tent. Fl. Ross. Orient. (1898) p. 493. *Pinus Ledebourii* Endlicher, Syn. Conif. (1847) p. 131; Ledeb. Fl. Ross. III, p. 672; Turczan. Fl. Baical.-Dahur. (1854, II) p. 413, no. 1068. *Larix intermedia* Fisch. ex Turczan. Cat. Baical. no. 1071.

Of common occurrence in the wood region of the territory traversed, absolutely preferring dry and hot ground, above all appearing to prevail on red Devonian sandstone, where occasionally rather small larch forests are to be found, for instance between Tshebertash and Ust Sisti-kem. Generally, it does not form woods, however, occurring scattered, intermingled with the fir, spruce, silver-fir, and, here and there, the cedar. In the Urjankai land, the tree vegetation on the so-called wood-steppes (лѣсостепь) seemed chiefly to consist of larch together with scattered firs, birches, and poplars. Similar wood-steppes are common in the tract of land between Ust Sisti-kem and the Dora Steppe. On the Abakan Steppe I found scattered larches on the tops of the ridges, and here and there on the islets in the river. In dry places in upland regions, for instance on the Tannu-Ola, the larch ascends quite as high as the cedar. In favourable situations the larch attains a height of over 40 m., with a trunk of about 1,5 m. in diameter. The trunks of rather old trees are often branchless, only with a small crown at the top.

Distribution: Northern and eastern Russia, Siberia, northern Mongolia, the Amoor Province.

Picea obovata Ledeb. Fl. Alt. IV, p. 201; Turczan. Cat. Baical. no. 1068; Крыл. Фл. Алт. VII (1914) p. 1718. *Picea vulgaris* Link. *var. altaica* Tepl. in Bull. Soc. Imp. Nat. Moscou (1868, III) p. 244—252. *Picea exelsa* Link, Korshinsky, Tent. Fl. Ross. Orient. (1898) p. 494. *Pinus orientalis* L. Spec. Pl. ed. II (1763) p. 1421; Ledeb. Fl. Ross. III, p. 671; Turczan. Fl. Baical.-Dahur. (1854, II) p. 412, no. 1067.

Very common in the wood region, where constituting the bulk of the dense, large taiga, occasionally accompanying *Abies sibirica*, the fir, cedar, and larch. The trunks attain a height of from 30 to 35 m. with a diameter at a man's height to 75 cm. On the mountains, at any rate in the Altaian, it does not ascend quite so high as the cedar. In moist, frequently mossy places it is often seen to propagate vegetatively, by means of branches lying along the ground, shooting roots. Near Ust Algiac I have observed this vegetative propagation to be of very common occurrence. The species is rather varying in growth. One form with short branches, not uncommonly somewhat bent upwards, especially prevails. As this from frequently attains a greater height than the common form, its narrow, slender, cylindrical crown rises higher than the level edge of the wood, in a very characteristic way. This form very commonly observed by me in subalpine tracts in the Amyl taiga.

Distribution: Northern Scandinavia, north-eastern Europe, Siberia, northern Mongolia, Manchooria.

Abies sibirica Ledeb. Fl. Alt. IV, p. 202; Крыл. Фл. Алт. VII (1914) p. 1715. *Pinus sibirica* Turczan. Cat. Baical. no. 1067; Ledeb. Fl. Ross. III, p. 669. *Pinus Pichta* Fisch. ex Endlich. Syn. Conif. p. 108; Turczan. Fl. Baical.-Dahur. (1854, II) p. 411, no. 1066.

Very common in the taiga, especially accompanying the cedar, spruce, birch, as well as the aspen. To be found both on moist and on dry ground. In the lowland it attains a height of to 30 m., with a trunk of 50 or 60 cm. in diameter. In the Altaian it ascends, on the mountains, to about 1650 m. above sea-level.

Distribution: North-eastern Russia, Siberia, forming woods to the Arctic circle, northern Mongolia, the Amoor Province.

Angiospermae Brongn.

Monocotyledones Juss.

Typhaceae St. Hilaire.

Typha angustifolia L. Spec. Pl. ed. II (1763) p. 1377; Ledeb. Fl. Alt. IV, p. 249; Turczan. Cat. Baical. no. 1177; Ledeb. Fl. Ross. III, p. 2; Turczan. Fl. Baical.-Dahur. (1854, III) p. 72, no. 1102; Graebn. *Typhaceae* in Engl. Pflanzenr. (IV, 8, 1900) p. 12; Крыл. Фл. Алт. VI (1912) p. 1255; Федченко, Рогозовыя-въ Федченко, Фл. Азіат. Россіи I (1913) p. 14.

On the margin of a swamp near Karatus.

Distribution: Europe, western Asia, Siberia to Trans Baikal, North America, Australia.

Typha latifolia L. Spec. Pl. ed. II (1763) p. 1377; Ledeb. Fl. Alt. IV, p. 249; Turczan. Cat. Baical. no. 1176; Ledeb. Fl. Ross. IV, p. 1; Turczan. Fl. Baical.-Dahur. (1854, III) p. 72, no. 1101; Федченко, Рогозовыя-въ Федченко, Фл. Азіат. Россіи I (1913) p. 12; Graebn. *Typhaceae* in Engl. Pflanzenr. (IV, 8, 1900) p. 8; Крыл. Фл. Алт. VI (1912) p. 1254.

On the borders of swamps near Kushabar, and in woods near the Amyl, between Kushabar and Petropawlowsk. With flowers about the middle of July.

Distribution: Europe, excepting the extreme northern portions, Siberia, south-western and central Asia, northern Mongolia, Manchooria, North Africa, North America.

Sparganiaceae Engl.

Sparganium simplex Huds. Fl. Angl. ed. II (1778) p. 401; Ledeb. Fl. Alt. IV, p. 236; Turczan. Cat. Baical. no. 1197; Ledeb. Fl. Ross. IV, p. 4; Turczan. Fl. Baical.-Dahur. (1854, III) p. 74, no. 1105; Ротертъ, Ежеголовковыя-въ Федченко, Фл. Азіат. Россіи (1913) p. 30; Meinsh. in Bull. Acad. Petersb. Nouv. Ser. IV (XXXVI) p. 33; Graebn. *Sparganiaceae* in Engl. Pflanzenr. (IV, 10, 1900) p. 16; Крыл. Фл. Алт. VI (1912) p. 1257.

In swamps on the banks of the river Abakan, near Ust Abakansk, in slow brooks by the road-side, between Minusinsk and Kushabar.

Flowering at the beginning of July.

Distribution: Europe, except the extreme south, the greater part of Asia, except the extreme east, North America.

Sparganium minimum Fries, Summa Veget. Scand. II (1849) p. 560; Meinsh. in Bull. Acad. Petersb. Nouv. Ser. IV (XXXVI) p. 37; Ротертъ, Ежеголовковыя-въ Федченко, Фл. Азіат. Россіи I (1913) p. 34; Крыл. Фл. Алт. VI (1912) p. 1258; Graebn. *Sparganiaceae* in Engl. Pflanzenr. (IV, 10, 1900) p. 23.

In eddies in the river Abakan, above Ust Abakansk.

Distribution: Europe, Siberia, northern Japan, North America.

Potamogetonaceae ASCHERS.

Potamogeton natans L. Spec. Pl. ed. II (1762) p. 182; Ledeb. Fl. Alt. I, p. 156; Turczan. Cat. Baical. no. 1068; Ledeb. Fl. Ross. IV, p. 23; Turczan. Fl. Baical.-Dahur. (1854, III) p. 62, no. 1087; Graebn. *Potamogetonaceae* in Engl. Pflanzenr. H. 31 (IV, 11, 1907) p. 42; Крыл. Фл. Алт. VI (1912) p. 1269.

In a small lake between Karatus and Kushabar. With flowers in the first half of July. Rather common in still creeks, and in swamps on the Dora Steppe.

Distribution: Europe, Asia, Africa, North America, and Australia.

Potamogeton perfoliatus L. Spec. Pl. ed II (1762) p. 182; Ledeb. Fl. Alt. I, p. 158; Turczan. Cat. Baical. no. 1087; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 833; Ledeb. Fl. Ross. IV, p. 27; Turczan. Fl. Baical.-Dahur. (1854, III) p. 64, no. 1090; Graebn. *Potamogetonaceae* in Engl. Pflanzenr. H. 31 (IV, 11, 1907) p. 92; Крыл. Фл. Алт. VI (1912) p. 1271.

All the specimens collected are sterile. The stems are from 1 to 1,5 mm. thick, the internodes from 3 to 8 cm. long. The leaves are rather narrow, not over 2,5 cm. broad, commonly 1,5 cm. broad, and from 6 to 7 cm. long when full-grown, and with a slightly undulating margin. The shape of the leaves is lanceolate, tapering upwards from the cordate base, completely clasping the stem, and rather acuminated at the apex.

Thus, in the form of the leaves, and in the long internodes, they agree perfectly with the East-Asiatic *f. mandschuriensis* BENNETT in Ann. Conserv. et. Jard. Genève IX (1905) p. 100. The latter, however, is especially characterized by its thick spike and numerous fruits, the midribs of which are winged, and, all the specimens collected being sterile, I dare not, with absolute certainty, refer them to this form.

The species is very common in the territory explored, in ponds, still creeks and slow rivers.

The rivers Abakan, Yenisei, Amyl, Sisti-kem, and Bei-kem.

Distribution: Europe, nearly all over Asia, North Africa, North America, Australia.

Potamogeton pusillus L. Spec. Pl. ed. II (1762) p. 184; Ledeb. Fl. Alt. I, p. 159; Turczan. Cat. Baical. no. 1093; Ledeb. Fl. Ross. IV, p. 29; Turczan. Fl. Baical.-Dahur. (1854,

III) p. 65, no. 1094; Graebn. *Potamogetonaceae* in Engl. Pflanzenr. H. 31 (IV, 11, 1907) p. 113; Крыл. Фл. Алт. VI (1912) p. 1276.

subspec. **tenuissimus** Mert. et Koch, Deutschl. Fl. I (1823) p. 857; Graebn. l. c. p. 116; Крыл. l. c. p. 1277.

In a small lake on an islet in the Yenisei, near Ust Abakansk, and at Ust Tara-kem.

Distribution: Europe, temperate portions of Asia, northern Mongolia, Africa, the Canaries, Madeira, North and South America, Greenland.

Potamogeton pectinatus L. Spec. Pl. ed. II (1762) p. 183; Ledeb. Fl. Ross. IV, p. 30; Turczan. Fl. Baical.-Dahur. (1854, III) p. 66, no. 1095; Graebn. *Potamogetonaceae* in Engl. Pflanzenr. H. 31 (IV, 11, 1907), p. 121; Крыл. Фл. Алт. VI (1912) p. 1277. *Potamogeton Vaillantii* Roem. et. Schult., Ledeb. Fl. Alt. I, p. 159. *Potamogeton vaginatus* Turczan. Cat. Baical. no. 1092.

In a still creek of the river Abakan, near Askys.

Distribution: Europe, temperate and southern Asia, North and South America, Africa, Australia.

Zannichellia pedicellata (Wahlenb.) Fries, Novit. Mant. III, p. 133; Ledeb. Fl. Ross. IV, p. 22.

subspec. **pedunculata** Aschers. et. Graebn. Synops. Mitteleurop. Fl. I (1913) p. 559; *f. gracilis* Hagstrøm, in Baagoe in Videnskab. Medd. Nat. Foren. Kjøbenhavn (1903) p. 183; Graebn. *Potamogetonaceae* in Engl. Pflanzenr. H. 31 (IV, 11, 1907) p. 156. *Zannichellia palustris* L. Spec. Pl. ed. II (1763) p. 1375; Ledeb. Fl. Alt. IV, p. 197; Крыл. Фл. Алт. VI (1912) p. 1206.

This species in commonly to be found floating on salt and brackish water in the swamps at Ust Kamuishto, where I have gathered it flowering and with ripe fruits in the second half of June. The ripe fruits are about 2 mm. long, on peduncles about 1 mm. long. The dorsal carina is slightly toothed, the ventral one smooth. The style is of about the same length as the fruit, generally quite straight, or slightly curved near the summit.

Distribution: The species is distributed nearly all over the globe, only wanting in Australia.

Juncaginaceae (Lindley) Aschers.

Triglochin maritima L. Spec. Pl. ed. II (1762) p. 483; Ledeb. Fl. Alt. II, p. 62; Turczan. Cat. Baical. no. 1083; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 830; Ledeb. Fl. Ross. IV, p. 35; Turczan. Fl. Baical.-Dahur. (1854, III) p. 34, no. 1079; Buchenau, *Scheuchzeriaceae* in Engl. Pflanzenr. H. 16 (IV, 14, 1903) p. 8; Крыл. Фл. Алт. VI (1912) p. 1280.

Very common on saliferous soil at Ust Kamuishto, where vigorous specimens, to 60 cm. high, have been gathered by me. Collected with flowers and fruits in the second half of June, at Tagarski osero with ripe fruits at the beginning of July.

Distribution: Europe, temperate portions of Asia, North Africa, North and South America.

Triglochin palustris L. Spec. Pl. ed. II (1762) p. 482; Ledeb. Fl. Alt. II, p. 62; Turczan. Cat. Baical. no. 1084; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 831; Ledeb. Fl. Ross. IV, 35; Turczan. Fl. Baical.-Dahur. (1854, III) p. 35. no. 1080; Buchenau, *Scheuchzeriacea* in Engl. Pflanzenr. 16 (IV, 14, 1903) p. 9; Крыл. Фл. Алт. VI (1912) p. 1280.

In moist moss-grown depressions on the Abakan Steppe, at Askys, near the river. In flower in the middle of June.

Distribution: Europe, excepting the extreme south-western portions, temperate portions of Asia, North and South America, Greenland.

Alismataceae (Lam.) R. Br.

Alisma Plantago L. Spec. Pl. ed. II (1762) p. 486; Ledeb. Fl. Alt. II, p. 64; Turczan. Cat. Baical. no. 1080; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 829; Ledeb. Fl. Ross. IV, p. 39; Turczan. Fl. Baical.-Dahur. (1854, III) p. 56, no. 1082; Buchenau, *Alismataceae* in Engl. Pflanzenr. H. 16 (IV, 15, 1903) p. 13; Крыл. Фл. Алт. VI (1912) p. 1282.

subspec. **Michalettii** Aschers. et. Graebn. Synops. Mitteleurop. Fl. I (1913) p. 582; Buchenau l. c.

In the swamps at Ust Kamuishto, and here and there on the margins of ponds, and the like, along the road between Minusinsk and Kushabar. Collected flowering in June and July, and with fruits in August, near Ust Tara-kem.

Distribution: The species in distributed over Europe, except northern Scandinavia, nearly all over Asia, North America, North Africa, and Australia.

Sagittaria sagittifolia L. Spec. Pl. ed. II (1763) p. 1410; Ledeb. Fl. Alt. IV, p. 247; Turczan. Cat. Baical. no. 1081; Ledeb. Fl. Ross. IV, p. 41; Turczan. Fl. Baical.-Dahur. (1854, III) p. 57, no. 1083; Buchenau, *Alismataceae* in Engl. Pflanzenr. H. 16 (IV, 15, 1903) p. 46; Крыл. Фл. Алт. VI (1912) p. 1283.

The leaves of this species observed here and there in still places in the Yenisei, between Krasnojarsk and Minusinsk. Specimens with fruits at Ust Tara-kem.

Distribution: Over the greater part of Europe, excepting the extreme northern and southern portions, south-western and central Asia, Siberia northwards to 66 ½° north latitude, northern Mongolia, eastern Asia, the East Indies.

Sagittaria natans Pallas, Reise Prov. Russ. Reich. III, Anhang (1776) p. 757; Buchenau, *Alismataceae* in Engl. Pflanzenr. H. 16 (IV, 15, 1903) p. 46. *Sagittaria alpina* Willd. in L. Spec. Pl. ed. IV (1805) p. 410; Ledeb. Fl. Alt. IV, p. 247; Turczan. Cat. Baical. no. 1082; Ledeb. Fl. Ross. IV, p. 41; Turczan. Fl. Baical.-Dahur. (1854, III) p. 58, no. 1084; Крыл. Фл. Алт. VI (1912) p. 1284.

In swamps near Ust Abakansk, and between Minusinsk and Kushabar. Found with young flowers in the second half of June and the first half of July.

Distribution: The north of Europe from northern Finland, northern Russia, Siberia, Manchooria.

Butomaceae (Gray) Micheli.

Butomus umbellatus L. Spec. Pl. ed. II (1762) p. 532; Ledeb. Fl. Alt. II, p. 93; Turczan. Cat. Baical. no. 1078; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 828; Ledeb. Fl. Ross. IV, p. 43; Buchenau, *Butomaceae* in Engl. Pflanzenr. H. 16 (IV, 16, 1903) p. 6; Крыл. Фл. Алт. VI (1912) p. 1285.

In swampy places on the banks of the Bei-kem, near the junction of that river with the Tara-kem. Nearly done flowering in the first half of August (*Var. minor* Ledeb.).

Distribution: Temperate portions of Europe and Asia, north-western India (Cashmere and Punjab).

Gramina Aschers. et Graebn.

Phalaris arundinacea L. Spec. Pl. ed. II (1762) p. 80; Ledeb. Fl. Alt. I, p. 76; Turczan. Cat. Baical. no. 1311; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 903; Рожевицъ, Злаки II-въ Федченко, Фл. Азіат. Россіи VI (1914) p. 95. *Digraphis arundinacea* (L.) Trin. Fundamenta Agrostograph. (1820) p. 127; Ledeb. Fl. Ross. IV, p. 454; Turczan. Fl. Baical.-Dahur. (1856, I) p. 7, no. 1285; Крыл. фл. Алт. VII (1914) p. 1549.

On the borders of a swamp near Askys, and between Minusinsk and Kushabar. At the beginning of July only with leaves. With fruits, near the Upper Bei-kem, on the Dora Steppe, in the middle of August.

Distribution: Europe, excepting the extreme southern portions, the Caucasus, south-western Asia, northern and eastern Mongolia, eastern Asia, North America.

Anthoxanthum odoratum L. Spec. Pl. ed. II (1762) p. 40; Ledeb. Fl. Alt. I, p. 45; Turczan. Cat. Baical. no. 1291; Ledeb. Fl. Ross. IV, p. 408; Turczan. Fl. Baical.-Dahur. (1856, I) p. 10 no. 1290; Рожевицъ, Злаки II-въ Федченко, Фл. Азіат. Россіи VI (1914) p. 98; Крыл. Фл. Алт. VII (1914) p. 1551.

f. glabrescens Celak. Prodr. Fl. Bøhm. (1867) p. 29.

Rather common in meadows and similar places near Kushabar, and in the subalpine tracts of the Amyl valley, at Ust Algiac, in the Altaian, ascending to above the limit of tree vegetation. The species varies considerably in the length and breath of the leaves, in the height of the culm, and especially in the floweriness and the density of the flowers in the panicle, some specimens having the panicle nearly unilateral. All the specimens collected are quite glabrous, only the ligules being furnished with a tuft of hairs. The glumes are, in all of the specimens collected, completely glabrous.

Distribution: Greater part of Europe, Asia Minor, the Caucasus, south-western Asia, Siberia, North Africa, North America, Greenland, Australia (introduced).

Hierochloë odorata (L.) Wahlenb. Fl. Ups. (1820) p. 32; Рожевицъ, Злаки II-въ Федченко, Фл. Азіат. Россіи VI (1914) p. 103; Крыл. Фл. Алт. VII (1914) p. 1552. *Hierochloë borealis* Roem. et. Schult. Syst. Veget. II (1817) p. 513; Ledeb. Fl. Alt. I, p. 92; Turczan. Cat. Baical. no. 1289; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 913; Ledeb. Fl. Ross. IV, p. 407; Turczan. Fl. Baical.-Dahur. (1856, I) p. 9, no. 1287. [Tab. II, Fig. 2].

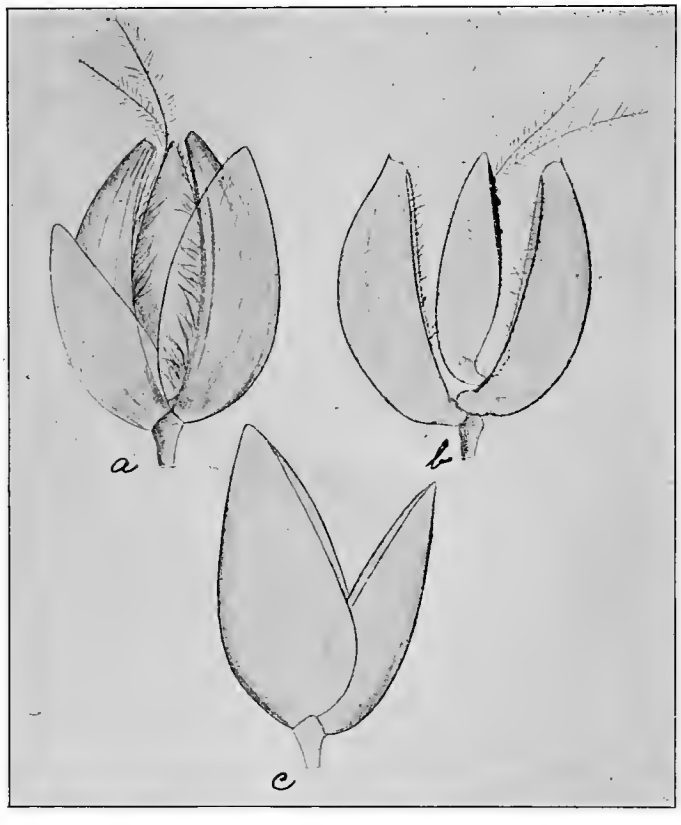

Fig. 72. *Hierochloë odorata* (L.) Wahlenb. (11/1.)
a. Spikelet. — b. Spikelet, the glumes are removed and the florets distended. — c. Empty glumes.

The specimens belonging to this one, gathered by me in South Siberia, constitute, in many respects, an intermediate form between the typical species *Hierochloë odorata* (L.) Wahlenb. and *Hierochloë dahurica* Trin. The culms are rather short, from 20 to 30 cm. high, slender, and glabrous. The leaves of the fertile shoots are from 1 to 2 cm. long, the sheaths rifled and very hairy *(f. pubescens)*. The barren shoots have leaves, generally rising above the panicle. The leaves are smooth, the margins only being somewhat scabrous. The panicle is short, lax, open, and broad, nearly ovate, the spikelets rather numerous, and the branches of the panicle straightly spreading. The spikelets are small, oblong, or nearly circular, from 2,5 to 4 mm. long. The glumes are broad, of unequal length, one of them generally only half enclosing the florets, the other one generally only slightly shorter than the florets, never projecting beyond them, membranous, with a green base, and generally furnished with one dorsal nerve only, lateral nerves wanting. At the summit more or less obtuse, never drawn out or pointed. The pales are of a shining brown, glabrous, or rarely sparingly pubescent but much fringed with long hairs.

All the florets of the spikelet attain the same height. In point of the structure of the spikelets these specimens agree best with *Hierochloë dahurica* Trin. but, according to their considerable height, their numerous spikelets, and spreading panicle more particularly with *Hierochloë odorata*. Upon a rather large material, *H. odorata* and *H.*

dahurica seem, on the whole, to become completely merged. Systematically, *H. dahurica* must therefore, most properly, be regarded as an easterly geographical subspecies of the typical *H. odorata*. The specimens found by me and mentioned here, thus seemed to remind much of this *H. odorata subspec. odorata* (Trin.) Rather common in sandy places near Minusinsk and on the Abakan Steppe, and in grass-grown places on the islets in the rivers Yenisei and Abakan. Flowering in June.

Distribution: Northern temperate zone of the old and the new world.

Hierochloë alpina (Lilj.) Roem. et. Schult. Syst. Veget. II (1817) p. 515; Ledeb. Fl. Alt. I, p. 92; Turczan. Cat. Baical. no. 1290; Ledeb. Fl. Ross. IV, p. 408; Рожевицъ, Злаки II-въ Федченко, Фл. Азіат. Россіи VI (1914) p. 101; Turczan. Fl. Baical.-Dahur. (1856, I) p. 9, no. 1289; Крыл. Фл. Алт. VII (1914) p. 1554.

The specimens collected are distinguished by their small spikelets, the length of which varies from 4 to 5 mm. The structure of the glumes and the florets, for the rest, agrees with the typical form. This one is separated by me as:

subspec. **microstachya** *nov. subspec.*

Spiculae minores quam in forma typica, fere 4—5 mm. longae.

Collected flowering at the end of July, in the Altaian, above the limit of trees, in places grown with moss and lichens.

Distribution: Arctic and alpine regions of the northern hemisphere, and on New-Zealand.

Stipa pennata L. Spec. Pl. ed. II (1762) p. 115; Ledeb. Fl. Alt. I, p. 84; Ledeb. Fl. Ross. IV, p. 450; Крыл. Фл. Алт. VII (1914) p. 1557.

subspec. **Joannis** (Celak.) Richt. Pl. Eur. 1 (1890) p. 32; Рожевицъ, Злаки III-въ Федченко, Фл. Азіат. Россіи XII (1916) p. 157.

Very characteristic plant of the steppes, about Minusinsk, and on the Abakan Steppe, where I have gathered it flowering in June, and on the Ulu-kem Steppe past flowering at the end of August.

Distribution: Middle, southern and eastern Europe, and adjoining portions of Asia to Turkestan, Persia, Afghanistan, Siberia, northern Mongolia, India.

Stipa capillata L. Spec. Pl. ed. II (1762) p. 116; Ledeb. Fl. Alt. I, p. 84; Turczan. Cat. Baical. no. 1272; Turczan. Fl. Baical.-Dahur. (1856, I) p. 16, no. 1297; Ledeb. Fl. Ross. IV, p. 448; Крыл. Фл. Алт. VII (1914) p. 1560; Рожевицъ, Злаки III-въ Федченко, Фл. Азіат. Россіи XII (1916) p. 167.

On the Abakan Steppe, and scattered on the steppes about the Ulu-kem, between Tapsa and Cha-kul. Done flowering in August.

Distribution: Middle and southern Europe, Turkestan, northern Persia, southern Siberia, Mongolia, and northern China.

Stipa sibirica (L.) Lam. Illustr. 1 (1791) p. 158; Ledeb. Fl. Alt. I, p. 82; Turczan. Fl. Baical.-Dahur. (1856, I) p. 15, no. 1296; Turczan. Cat. Baical. no. 1271; Ledeb. Fl. Ross. IV, p. 448; Крыл. Фл. Алт. VII (1914) p. 1562; Рожевицъ, Злаки III-въ Федченко, Фл. Азіат. Россіи XII (1916) p. 124. *Avena sibirica* L. Spec. Pl. ed. II (1762) p. 117.

On the steppes between Tapsa and Bjelosarsk, here and there accompanying the preceding one. Done flowering in August.

Distribution: South-western and central Asia, Mongolia, north-western China, Sakhalin, Japan.

Phleum pratense L. Spec. Pl. ed. II (1762) p. 87; Ledeb. Fl. Ross. IV, p. 457; Крыл. Фл. Алт. VII (1914) p. 1572.

In natural meadows, near Ust Sisti-kem.

Distribution: Europe, temperate portions of Asia, North America.

Phleum alpinum L. Spec. Pl. ed. II (1762) p. 88; Ledeb. Fl. Alt. I, p. 73; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 900; Ledeb. Fl. Ross. IV, p. 458; Крыл. Фл. Алт. VII (1914) p. 1573.

Rather common in the Altaian, in subalpine tracts of wood as well as above the limit of tree vegetation, ascending right up into the lichen belt. In full flower at the end of July.

Distribution: Europe, Asia Minor, central Asia, Siberia, eastern Asia, Japan, North and South America, Greenland.

Phleum Boehmeri Wibel, Primit. Fl. Werth. (1799) p. 125; Ledeb. Fl. Ross. IV, p. 456; Turczan. Fl. Baical.-Dahur. (1856, I) p. 6, no. 1283; Крыл. Фл. Алт. VII (1914) p. 1574. *Chilochloa Boehmeri* P. de Beauv. Agrost. (1812) p. 158; Ledeb. Fl. Alt. I, p. 85; Turczan. Cat. Baical. no. 1267; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 909.

subspec. **decurtatum** *nov. subspec.*

Glumis ab forma typica differens superne obtusioribus, paene rectis angulis sectis, neque, ut in forma typica, superne sensim attenuatis vel oblique truncatis. Glumae semper valde scabrae.

The glumes are rather short, the length being only about 2 mm., generally broadest near the summit, where nearly cut off square, not tapering upwards or cut off obliquely, as in the typical form, which will also appear from the drawings by Reichenb. Iconogr. Fig. 1488, Andersson, Afbildningar Tab. XII, Fig. 132, and in Flora Danica Tab. 531, etc. The awns are comparatively short, bent outwards, diverging. The glumes are slightly scabrous on the keel, of a greyish-green colour, with a rather broad, membranous, parchmentlike margin.

By its rather truncate glumes our plant reminds somewhat of *Phleum asperum* Vill. and *Phleum pratense* L., from which, however, it is readily distinguished by its structure for the rest. The glumes are not quite uniform, the lower one being broadest, especially above, glabrous at the margin, the upper one somewhat narrower, and not so

truncate and suddenly cut off, and, besides, pubescent at the margin. The glumes are broadly scarious-margined and rough — especially so along the keel, which is nearly slightly prickly — and 3-nerved, of which the midmost one, the dorsal nerve, projects into the short awn. The length of the florets is, to some extent, varying, being roughly from the same as that of the glumes to about ⅓ shorter.

From the steppes of southern Russia I have seen specimens of *Phleum Boehmeri* subspec. *laeve* (M. Bieb. spec!) which, in the structure of the glumes, shows some approach towards this one; the glumes in this subspecies are, however, glabrous or nearly quite so. Our plant is, for the rest, of the same structure as the typical species.

Rather common in dry meadows, on hot, stony slopes etc., on the Abakan Steppe, and on the islets in the Yenisei and Abakan. Young, unblown flowers in the middle of June. All of the specimens collected belong to subspec. *decurtatum*.

Distribution: Temperate portions of Europe and Asia.

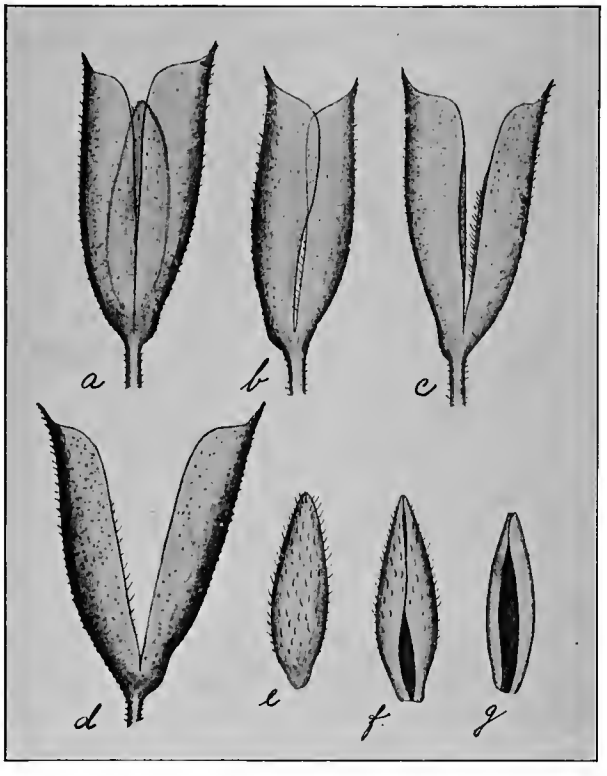

Fig. 73. *Phleum Boehmeri* Wibel subspec. *decurtatum* nov. subspec. (19/1) a. Spikelet. — b, c, d. Glumes. — e. Floret, seen from the side. — f, g. Pales, seen from the interior side.

Alopecurus pratensis L. Spec. Pl. ed. II (1762) p. 88; Ledeb. Fl. Alt. I, p. 74; Turczan. Cat. Baical. no. 1265; Turczan. Fl. Baical.-Dahur. (1856, I) p. 4, no. 1281; Крыл. Фл. Алт. VII (1914) p. 1577.

subspec. **typicus** Aschers. et. Graebn. Synops. Mitteleur. Fl. II (1898) p. 132; Крыл. l. c. p. 1578.

The species varies rather much in the dimensions of the panicle, the length and hairiness of the spikelets, and in the breadth and length of the leaves. Collected flowering in June. Rather frequent on grass-land on the islets in the rivers Yenisei and Abakan, and also at Ust Sisti-kem, near the Bei-kem, and at Ust Tara-kem.

Distribution: Europe, except the extreme south-eastern portions, south-western Asia, Siberia, Mongolia, Japan.

Alopecurus ventricosus Pers. Syn. I (1805) p. 80; Крыл. Фл. Алт. VII (1914) p. 1580. *Alopecurus ruthenicus* Weinm. Cat. Dorpat. (1810) p. 10; Ledeb. Fl. Ross. IV, p. 463. *Alopecurus pratensis* L. *var. ruthenicus* Ledeb. Fl. Alt. I, p. 74.

In moist, grass-grown places on the Abakan Steppe, near Askys. Flowering in the middle of June.

Distribution: Middle and northern Europe, south-western and central Asia, northern Mongolia, North Africa.

Alopecurus fulvus Smith, Engl. Bot. XXI (1805) t. 1497; Ledeb. Fl. Ross. IV, p. 464.

subspec. **sibiricus** Kryl. Фл. Алт. VII (1914) p. 1581.

On moist, grassy banks of rivers, on the Amyl, near Kushabar, and on the banks of the Sisti-kem, near Ust Sisti-kem, and near Ust Algiac. With flowers at the beginning of July. Taken with fruits at Ust Tara-kem in the middle of August.

Distribution: The species is distributed over the greater part of Europe, south-western Asia, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan.

Agrostis canina L. Spec. Pl. ed. II (1762) p. 92; Ledeb. Fl. Alt. I, p. 86; Ledeb. Fl. Ross. IV, p. 440; Крыл. Фл. Алт. VII (1914) p. 1585.

Rather common in somewhat moist places in the territory explored. At Ust Abakansk, on the banks of the Amyl, near Kushabar, on the Sisti-kem, near Ust Algiac, scattered on the Upper Bei-kem. With flowers in July and August.

Distribution: Europe, Siberia, northern Mongolia, eastern Asia, North America, Greenland.

Agrostis alba L. Spec. Pl. ed. II (1762) p. 93; Ledeb. Fl. Ross. IV, p. 436; Turczan. Fl. Baical.-Dahur. (1856, I) p. 17, no. 1298; Крыл. Фл. Алт. VII (1914) p. 1586. *Agrostis polymorpha* Huds. Fl. Angl. I (1762) p. 31; Ledeb. Fl. Alt. I, p. 85.

subspec. **genuina** Aschers. et Graebn. Synops. Mitteleur. Fl. II (1899) p. 174; Крыл. l. c. 1587. In moist meadows on the banks of the Amyl, near Kushabar. With flowers in the middle of June.

Distribution: The species is spread over Europe, temperate portions of Asia, North America, Greenland, North Africa, introduced into Australia.

Agrostis vulgaris With. Bot. Arrangem. Veg. Great-Brit. IV, ed. II (1776) p. 132; Ledeb. Fl. Ross. IV, p. 438; Крыл. Фл. Алт. VII (1914) p. 1588.

In moist, grass-grown fields, on islets in the river Abakan, near Ust Kamuishto. Specimens collected in the second half of June, bearing flowers not yet full-blown.

Distribution: Europe, south-western Asia, western Siberia, roughly to the Yenisei, North Africa, North America.

Agrostis clavata Trin. in Spreng. Neue Entdeck. II, p. 55; Крыл. Фл. Алт. VII (1914) p. 1589. *Agrostis laxiflora* R. Br. Verm. Bot. Schrift. I, p. 472; Ledeb. Fl. Ross.

IV, p. 441; Turczan. Fl. Baical.-Dahur. (1856, I) p. 18, no. 1300. *Agrostis Michauxii* Trin. De Gramin. Uniflor. (1824) p. 206; Turczan. Cat. Baical. no. 1274.

The culms of the specimens gathered are from 20 to 30 cm. high, very slender and fine, frequently somewhat lax and weak. The leaves are to 1,5 mm. broad. It therefore seemed to have to be referred to *f. flaccida* Kryl. l. c.

In moist, subalpine meadows in woods in the Altaian. Specimens collected at the end of July nearly done flowering.

Distribution: Siberia, eastern Asia, Sakhalin, Japan, north-western part of North America.

Calamagrostis neglecta P. de Beauv. Ess. Agrostograph. (1812) p. 157; Ledeb. Fl. Ross. IV, p. 428; Turczan. Fl. Baical.-Dahur. (1856, I) p. 25, no. 1310; Крыл. Фл. Алт. VII (1914) p. 1597. *Arundo stricta* Turczan. Cat. Baical. no. 1283.

On the borders of a small lake on an islet in the Yenisei, near Minusinsk, in moist pastures on the Sisti-kem, near Ust Algiac, in moist meadows on the Bei-kem, near the mouths of the rivers Kamsara and Tara-kem.

Distribution: Arctic Islands, northern, central, and eastern Europe, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North America, Greenland.

Calamagrostis Langsdorffii (Link) Trin. De Gramin. Uniflor. (1824) p. 225; Turczan. Fl. Baical.-Dahur. (1856, I) p. 23, no. 1306; Ledeb. Fl. Ross. IV, p. 430; Литвиновъ, О *Calamagrostis Langsdorffii* (Link) Trin. и близк. формахъ-въ Труд. Бот. Муз. Импер. Акад. Наукъ, VIII, p. 50; Крыл. Фл. Алт. VII (1914) p. 1598. *Calamagrostis lanceolata* Ledeb. Fl. Alt. I, p. 86. *Calamagrostis Halleriana f. nutans* Ledeb. Fl. Ross. IV, p. 431. *Calamagrostis villosa* Mutel *var. Langsdorffii* (Trin.) Hack. in Somm. N. G. B. It. XXV (1893) p. 98.

Scattered in moist meadows in woods, on the banks of rivers, and on the borders of swamps. Rather common on islets in the river Abakan, at Kushabar, in the Amyl valley, at Ust Algiac, on the banks of the river, at Ust Sisti-kem, in moist, grass-grown islets in brush-wood in the Bei-kem, near the mouths of the rivers Kamsara and Tara-kem.

The species occurs in a multitude of varieties, which hardly possess any systematical value, connected as they are by intermediate forms. The glumes are partly completely glabrous, and partly pass through various intermediate types into forms with the outer glumes finely and densely pubescent, and the sheaths vary from being quite smooth to markedly rough. In subalpine pine-woods in the Altaian, I have gathered specimens belonging to this species, distinguished by a more delicate and slender growth, the panicle being shorter, poorer, and more flaccid, and the branches more spread and open than in the typical form. The glumes are generally slightly and finely hairy (f. *gracilis*). Taken flowering at the end of July.

Distribution: The species is distributed over eastern Europe, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North America.

Calamagrostis elata Blytt, Norsk Flora (1847) p. 143; Литвиновъ, О *Calamagrostis Langsdorffii* (Link) Trin. и близк. формахъ–въ Труд. Бот. Муз. Импер. Акад. Наукъ, VIII, p. 50; Крыл. Фл. Алт. VII (1914) p. 1600.

On islets in the Yenisei, in moist brush-wood. Specimens gathered at the beginning of June, not yet bearing full-blown flowers.

Distribution: Northern Europe, Siberia, eastwards to the Yenisei.

Calamagrostis epigeios (L.) Roth, Tent. Flor. Germ. I (1788) p. 34; Ledeb. Fl. Alt. I, p. 87; Turczan. Cat. Baical. no. 1279; Ledeb. Fl. Ross. IV, p. 432; Turczan. Fl. Baical.-Dahur. (1856, I) p. 23, no. 1305; Крыл. Фл. Алт. VII (1914) p. 1603.

In dry brush- wood on the islets in the junction of the river Abakan with the Yenisei, near Kalna in the Amyl valley, scattered along the Upper Sisti-kem. Flowering in July and the first half of August.

Distribution: Temperate portions of Europe and Asia, South Africa.

Aëra caespitosa L. Spec. Pl. ed. II (1762) p. 96; Ledeb. Fl. Alt. I, p. 90; Turczan. Cat. Baical. no. 1292. *Deschampsia caespitosa* P. de Beauv. Ess. Agrostograph. (1812) p. 160; Ledeb. Fl. Ross. IV, p. 421; Turczan. Fl. Baical.-Dahur. (1856, I) p. 31, no. 1317.

Common in moist meadows in woods, near Kushabar, in subalpine and alpine tracts near the Sisti-kem and in the Altaian, where full-blown at the end of July, and also on the banks of the Bei-kem, near Tara-kem, and at Sebi.

Distribution: Europe, temperate portions of Asia, Africa, North America, Australia.

Trisetum flavescens (L.) P. de Beauv. Ess. Agrostograph. (1812) p. 88; Ledeb. Fl. Alt. I, p. 91; Turczan. Cat. Baical. no. 1296; Крыл. Фл. Алт. VII (1914) p. 1609. *Avena flavescens* L. Spec. Pl. ed. II (1762) p. 118; Ledeb. Fl. Ross. IV, p. 417; Turczan. Fl. Baical.-Dahur. (1856, I) p. 32, no. 1319.

subspec. **copiosum** *subspec. nov.*

Caulibus validis et foliis latis praecipue distinctum. Caules plus minus 1 m. alti, rigidi, erecti, sulcati, semper glabri. Folia 8—10 mm. lata, vaginae semper laevissimae. Gluma superior longitudine paleas aequans vel paululum brevior, comparate angusta, in medio latissima, utroque sensim angustior, in apice attenuata et rotundata, nunquam extracta vel acuminata, sed nonnunquam obtusa et truncata, trinervia. Glüma inferior angusta, paene recta, e basi sensim attenuata et acuminata, uninervia. Utraque gluma secundum nervum medium scabra. Palea inferior angustior quam in forma typica, infra medium semper latissima, superne sensim angustior et arista longiore scabra instructa. Panicula satis multiflora, rami paene omnino glabri, sub ipsa spicula tantum nonnunquam scabriusculi. Spiculae pauciflorae, plerumque 2, nonnunquam 3, flores ferentes.

The widely distributed species *Trisetum flavescens* (L.) P. de Beauv. varies considerably, especially in hairiness, richness in flowers, size, and colour of the spikelets, density of the panicle etc., and has been divided into a great number of forms, of

which some, at least, seemed to be pretty definitely characterized geographical races. The specimens belonging to this species, to be found in my collections, seemed, in some respects, to differ from those already described. They are readily distinguished by their vigorous growth, with erect, ribbed, but always completely glabrous culms, to above 1 m.

Fig. 74. *Trisetum flavescens* (L.) P. de Beauv. subspec. *copiosum* nov. subspec. ($^{11}/_{1}$). a. Lower pale. — b. Spikelet. — c and d. Glumes.

high. Even below the nodes, the culms are always completely glabrous. The sheaths are round, slightly inflated, considerably shorter than the internodes, which is also the case in the lower ones. Owing to this fact, the specimens remind of *f. glabratum* Aschers. Fl. Prov. Brandenb. I (1864) p. 830. The ligules are broad, short, from 1 to 2 mm. long, rounded at the top, slightly indented or tattered, the margin never hairy. The leaves 18 to 20 cm. long, and comparatively very broad, 8 to 10 mm., tapering and pointed towards the summit, the margin completely smooth or slightly scabrous, and sometimes with some long, fine, scattered hairs on the upper side. The under side is always smooth. The panicle is 10 to 12 cm. long, and 3 to 4 cm. broad, brownish green, erect. The branches long, tender, frequently somewhat relaxed, smooth, sometimes rough to

the touch in their upper part, immediately below the spikelets. Our plant, however, is especially distinguished in the structure of the spikelets. The upper glume is generally somewhat longer than in the typical species, about 6—8 mm. long, thus attaining about the same height as the pales; it is comparatively narrow, broadest about the middle, and tapering towards the summit and towards the base, gradually narrowed at the top, stubby and rounded or sometimes nearly truncate, not like the typical form broadest about the upper third of the glume, from where, towards the summit, being rather suddenly concavely emarginate, and prolonged into a fine point. It is, moreover, broadly scarious-margined, 3-nerved, the nerves, the midrib as well, gradually vanishing towards the summit, and never prolonged into a point, which is generally the case in the typical form. This structure of the upper glume is especially characteristic of this subspecies.

The lower glume is about half as long as the upper one, one-nerved, tapering upwards from the base, and pointed, rough to the touch along the keel. The spikelets are comparatively few-flowered, generally with 2 or 3 florets only, rather far apart on the hairy axis. Length of the spikelets from 7 to 9 mm. The lower pale in subspecies *copiosum* is considerably narrower than in the typical form, broadest below the middle, and never above, tapering upwards, bicuspidate at the apex, never projecting as in the ordinary form. The awn is slightly scabrous, its length varying to about the same length as the pale itself. The upper pale is of about the same length as the lower one, completely membranous and transparent, 2-keeled, with scabrous keels, pointed at the top, and slightly 2-toothed, with fine hairs along the margin. The caryops in all the specimens collected are very young and small, but seemed to be completely glabrous.

This variety resembles much the subspecies *alpestre* in its nearly glabrous panicle-branches, and in having a smaller number of florets in the spikelets, moreover in having the upper pale broadest about the middle, or more commonly, below the middle.

It is, however, markedly distinguished from the above subspecies by its culms, 3 times as high, and, upon the whole, by its more vigorous growth, the leaves being longer and broader, the panicle far richer, and by the shape of the awns, etc. It seemed, accordingly, in many respects, to be intermediate between the subspecies *pratense* and *alpestre*.

Specimens of this type gathered by me in several places in the territory explored, at Kushabar and in subalpine regions about Ust Algiac, near Ust Sisti-kem, and at Ust Kamsara. Taken with young flowers in July and August.

Distribution: The species is distributed nearly all over Europe, except the extreme north, Caucasia, Asia Minor and south-western Asia, the Thian-Shan, the Himalayas, Siberia to 61° north latitude, and eastwards to Sakhalin, the Amoor Province, Manchooria, introduced into North America.

Trisetum subspicatum (L.) P. de Beauv. Ess. Agrostograph. (1812) p. 88; Крыл. Фл. Алт. VII (1914) p. 1612. *Trisetum airoides* Roem. et. Schult. Syst. Veget. II (1817) p.

666; Ledeb. Fl. Alt. I, p. 92; Turczan. Cat. Baical. no. 1297; Turczan. Fl. Baical.-Dahur. (1856, I) p. 33, no. 1320. *Avena subspicata* Clairvill. Man. (1811) p. 17; Ledeb. Fl. Ross. IV, p. 418.

In alpine tracts of the Altaian, in places grown with mosses and lichens. Flowering at the end of July.

Distribution: Europe, northern, central, and eastern Asia, North America, Greenland.

Avena desertorum Lessing in Linnaea IX (1834) p. 208; Ledeb. Fl. Ross. IV, p. 415; Turczan. Fl. Baical.-Dahur. (1856, I) p. 35, no. 1324; Крыл. Фл. Алт. VII (1914) p. 1616. *Avena sempervirens* Bess. Enum. Pl. Volh. (1822) p. 6; Ledeb. Fl. Alt. I, p. 89; Turczan. Cat. Baical. no. 1294; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 911. *Avena Besseri* Gries. in Ledeb. Fl. Ross. IV, p. 415.

In dry grass-fields, and on the steppes about the river Abakan. Taken in full bloom in the middle of June.

Distribution: South-eastern Europe, southern Siberia, northern Mongolia, central Asia.

Avena pubescens Huds. Fl. Angl. ed. I (1762) p. 42; Ledeb. Fl. Ross. IV, p. 413; Turczan. Fl. Baical.-Dahur. (1856, I) p. 34, no. 1321; Крыл. Фл. Алт. VII (1914) p. 1617. *Avena pratensis* L., Ledeb. Fl. Alt. I, p. 90; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 912.

On islets in the river Abakan, in grass-grown places, and in the Urjankai country, at Ust Tara-kem. Some of the specimens collected belong to *f. alpina* Gaud. Fl. Helvet. I (1828) p. 334.

Besides, I have collected specimens distinguished from the typical form chiefly by broader leaves, and having the spikelets larger and more numerous. This form is separated by me as:

f. **latifolia** nov. f.

Luxuria et foliis latis ab forma typica differens. Folia usque ad 14 mm. lata, in extremis in parvum acumen subito contracta. Panicula lata et multiflora, rami valde scabri. Gluma longissima paleas logitudine aequans vel longior. Paleae fere aequales.

Culm to 1 m. high, vigorous, erect, or somewhat ascending at the base, round, furrowed, and glabrous. Sheaths somewhat inflated, nearly as long as the internodes, striped, densely covered with long, white, somewhat descending hairs, especially the lower sheaths nearly quite downy and whitish. Ligules prominent, from 5 to 8 mm. long, rounded, and frequently slightly tattered at the top.

Leaves broad, to 14 mm. in breadth, and to 30 cm. in length, flat, equally broad, suddenly rounded and shortly pointed at the apex, densely hairy beneath, glabrous, or only with scattered hairs above. Panicle 17 to 20 cm. long, spreading, of a greyish green or palish yellow, often somewhat relaxed and unilateral, and exceedingly flowery. Rachis erect, or sometimes slightly twisted, equally thick, in the lower part smooth, in

the upper part generally somewhat rough. Branches generally from 5 to 8 at each of the lower nodes in the panicle, to 5 or 6 cm. long, slender, very rough, bearing to 7 or 8 spikelets. Pedicels from 1 to more than 2 cm. long, rough, generally somewhat thickened at the end.

Not unfrequently there occur long, vigorous panicle-branches serving for main axes of whorls of second order, and may thus bear up to 20 spikelets, giving the panicle an irregular appearance. Spikelets up to 18—19 mm. long, 2 to 4 flowered, not unfrequently with an incompletely developed terminal floret, with the florets rather far apart. The upper glume about 18—19 mm. long, 3- or sometimes 5-nerved, tapering to a point, rough along the nerves, of the same length as the florets, or sometimes a little longer, the lower one about ⅔ shorter, 1-nerved, with a long point, and rough nerve. Both of them are membranous, greenish only along the nerves, frequently with a tinge of violet at the base. The whole panicle is of a pale yellowish green colour, like *f. flavescens* GAUD. Axis of the florets beset with long, erect, rather stiff hairs, often reaching higher than up to the middle of the floret, while, in the typical species, they are commonly only $^1/_5$ to $^1/_6$ as long. Lower pale 13 to 15 mm. long, gradually acuminate, lanceolate, terminated by 2 short acute teeth, roughly dotted on the back, 4-nerved, and about the middle furnished with a long, geniculate, rough awn, projecting 15 to 18 mm. beyond the apex of the pale itself. The upper pale only slightly shorter, awnless.

Occurring in meadows, and in thickets of *Salix* on islets in the river Abakan, near Askys. In full flower in the middle of June.

Besides, I have collected, in the neighbourhood of Kushabar, some specimens of a very few-flowered form, differing also in other characters from the typical species. I enter this one as:

f. **depauperata** nov. f.

Panicula ex paucis spiculis composita praecipue distincta. Rami 2-3 ex nodis singulis enati, brevissimi, longitudine 0,2-0,3 mm. plerumque non excedentes, non furcati. Sua cuique ramo spicula una. Spiculae igitur pediculo brevissimo axi ipsi affixae. Spiculae singulae 2-3 flosculos in se continentes. Gluma superior saepius tanta ut spiculam totam circumcludat.

Culms 70 to 80 cm. high, cylindrical, furrowed, always completely glabrous. Sheaths, especially the lower ones, densely long-haired, the upper ones more or less glabrous. Leaves 8 to 10 cm. long, and 6 to 7 mm. broad, equally broad, rather suddenly contracted and pointed at the apex, hairy, but not rough beneath, glabrous above. Ligules about 5 mm. long, somewhat pointed at the top, and slightly tattered. The lower part of the rachis smooth, the upper part more or less rough. Panicle narrow, 10 to 12 cm. long, its branches 2 or 3 in the lower nodes, very short, from 2 to 9 mm., generally from 2 to 5 mm. long, slightly rough, always unbranched, and reduced to pedicels, each one only with one solitary spikelet. The pedicels slightly thickened immediately below the spikelet. Spikelets 2- or 3-flowered, 13 to 15 mm. long. The upper glume, projecting beyond the summit of the florets, is 3-nerved, acuminate, more or less tattered

at the top, with a broad membranous edge. The lower glume only ⅔ as long, 1-nerved. The pales are surrounded by a tuft of hairs at the base, the lower one 4-nerved, somewhat roughly dotted, bicuspidate or slightly tattered at the top, about the middle furnished with a long rough, geniculate awn projecting 12 to 13 mm. beyond the apex of the pale itself. The upper pale is slightly 2-nerved, 2-toothed at the apex, of the same length as the outer one.

Thus, this form is especially characteristic in having a narrow, few-flowered panicle, always with unramified branches reduced to pedicels. The upper glume is generally so large as to enclose the spikelet completely.

This variety may possibly have a greater systematic value; however, this question must be left undecided, as my material is too scarce to enable me to try the value of the various characters. Gathered in thickets near Kushabar, in full flower at the end of July.

Distribution: The species *Avena pubescens* is distributed over Europe, except the extreme northern and south-western portions, Caucasia, Asia Minor, south-western and western Asia, Siberia eastwards to Trans Baikal.

Avena pratensis L. Spec. Pl. ed. II (1762) p. 119; Ledeb. Fl. Ross. IV, p. 414 ex parte; Turczan. Fl. Baical.-Dahur. (1856, I) p. 34, no. 1322 ex parte. Крыл. Фл. Алт. VII (1914) p. 1619. *Avena pratensis* L. *var.* in Ledeb. Fl. Alt. I, p. 90. *Avena pratensis* L. *var. typica* Korshinsky, Tent. Fl. Ross. Orient. (1898) p. 471, no. 1451.

In dry grass-field, and on steppes near Buistraja and near Askys, on the Abakan Steppe. In full flower in the middle of June.

Distribution: Middle and northern Europa, Siberia, North Africa (?).

Avena Schelliana Hackel in Act. Hort. Petropol. XII (1893) p. 419. *Avena pratensis* L. in Ledeb. Fl. Ross. IV, p. 414 ex parte; Turczan. Fl. Baical.-Dahur. (1856, I) p. 34, no. 1322 ex parte. *Avena pratensis* L. *var. Schelliana* (Hackel) Korshinsky, Tent. Fl. Ross. Orient. (1898) p. 471, no. 1451; Крыл. Фл. Алт. VII (1914) p. 1619.

Rather frequent on the Abakan Steppe, near Askys. Specimens taken in the middle of June, bearing young flowers, not fully opened.

Distribution: Eastern Russia, southern Siberia, Manchooria, North Africa.

Avena planiculmis Schrad. Fl. German. I (1806) p. 381; Ledeb. Fl. Ross. IV, p. 414; Turczan. Fl. Baical.-Dahur. (1856, I) p. 35, no. 1323.

Pretty common on an islet in the Yenisei, near Ust Abakansk, among grass, in somewhat moist brush-wood. With young flowers at the beginning of June.

Distribution: South-eastern Europe, south-western Asia, Siberia, Manchooria.

Beckmannia eruciformis (L.) Host, Gram. Austr. III (1805) p. 5; Ledeb. Fl. Alt. I, p. 94; Turczan. Cat. Baical. no. 1310; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 917; Ledeb. Fl. Ross. IV, p. 453; Turczan. Fl. Baical.-Dahur. (1856, I) p. 8, no. 1286. Крыл. Фл. Алт. VII (1914) p. 1622.

Rather common in the territory explored. In moist thickets and meadows, on river-banks etc., on islets in the river Abakan, in moist pastures, near the banks of the Bei-kem, on the Sebi, as well as on muddy river-banks at the mouth of the river Kemchik. The species flowers in July. The specimens gathered have mostly 2-flowered spikelets, and are therefore to be referred to *f. communis* Krylow l. c.

Distribution: Southern Europe, south-western Asia, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North America.

Phragmites communis Trin. Fundam. Agrost. (1820) p. 134; Ledeb. Fl. Alt. I, p. 88; Turczan. Cat. Baical. no. 1299; Karel.et Kiril. Enum. Pl. Fl. Alt. no. 910; Turczan. Fl. Baical.-Dahur. (1856, I) p. 28, no. 1314; Крыл. Фл. Алт. VII (1914) p. 1624. *Arundo Phragmites* L. Spec. Pl. ed. II (1762) p. 120; Ledeb. Fl. Ross. IV, p. 393.

On the banks of small lakes, in moist meadows, etc., along the river Abakan. Specimens collected in the middle of June are young, with flowerless culms, only about ½ m. high.

Distribution: Europe, and temperate portions of Asia, North and South America, Australia.

Diplachne squarrosa (Trin.) Richter, Pl. Eur. I (1890) p. 72; Крыл. Фл. Алт. VII (1914) p. 1625. *Molinia squarrosa* Trin. in Ledeb. Fl. Alt. I, p. 105; Turzan. Cat. Baical. no. 1315; Ledeb. Fl. Ross. IV, p. 396; Turczan. Fl. Baical.-Dahur. (1856, I) p. 48, no. 1342.

Scattered on the Abakan Steppe, on dry slopes, in dried up beds of brooks, etc. With young flowers at the end of June.

Distribution: South-eastern Russia, southern Siberia to Trans Baikal, northern Mongolia.

Eragrostis minor Host, Gram. Austr. IV (1809) p. 15. *Eragrostis poaeoides* P. de Beauv. Ess. Agrostograph. (1812) p. 162; Ledeb. Fl. Alt. I, p. 94; Turczan. Fl. Baical.-Dahur. (1856, I) p. 42, no. 1334; Ledeb. Fl. Ross. IV, p. 381; Крыл. Фл. Алт. VII (1914) p. 1627.

Rather common at Kemchik-bom, among sand on the river, and on the cliffs near the mouth. Taken with ripe seeds at the beginning of September.

Distribution: Middle and southern Europe, southern Siberia, northern Mongolia, the East Indies, eastern Asia, North Africa, North America (introduced).

Eragrostis pilosa (L.) P. de Beauv. Ess. Agrostograph. (1812) p. 162; Ledeb. Fl. Alt. I, p. 95; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 918; Ledeb. Fl. Ross. IV, p. 382; Turczan. Fl. Baical.-Dahur. (1856, I) p. 42, no. 1335; Крыл. Фл. Алт. VII (1914) p. 1627.

On the banks of the Yenisei, near Ust Abakansk. With young flower-buds at the beginning of July.

Distribution: Southern and middle Europe, temperate portions of Asia, North Africa, North America, and Australia (introduced).

Melica nutans L. Spec. Pl. ed. II (1762) p. 98; Ledeb. Fl. Alt. I, p. 93; Turczan. Cat. Baical. no. 1312; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 915; Ledeb. Fl. Ross. IV, p. 399; Turczan. Fl. Baical.-Dahur. (1856, I) p. 49, no. 1343; Крыл. Фл. Алт. VII (1914) p. 1640.

In dry thickets, etc., near Kushabar and Ust Algiac. Specimens taken in the middle of July nearly past flowering.

Distribution: Europe, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan.

Koeleria glauca D. C. Cat. Hort. Monsp. (1813) p. 116; Ledeb. Fl. Ross. IV, p. 402; Domin, Monograph. Gatt. *Koeleria* in Bibl. Bot. H. 65 (1907) p. 55; Крыл. Фл. Алт. VII (1914) p. 1629. *Koeleria cristata* Pers. in Karel. et Kiril. Enum. Pl. Fl. Alt. no. 927. *Koeleria cristata* β in Ledeb. Fl. Alt. I, p. 103.

subspec. **typica** Domin l. c.; Крыл. l. c.

Scattered in dry, sandy places in open woods of *Pinus silvestris*, near Tagarski osero. Taken flowering at the beginning of July.

Distribution: Middle and southern Europe, Siberia, eastern Asia, Africa, North America.

Koeleria gracilis Pers. Synops. Plant. I (1805) p. 97; Domin, Monograph. Gatt. *Koeleria* p. 176; Крыл. Фл. Алт. VII (1914) p. 1633. *Koeleria cristata* Pers. in Ledeb. Fl. Alt. I, p. 103 ex parte; Ledeb. Fl. Ross. IV, p. 401 ex parte; Turczan. Fl. Baical.-Dahur. (1856, I) p. 51, no. 1346 ex parte.

This species is very common on dry steppes, and in dry, sandy situations in open pine-wood about Minusinsk. On the Abakan Steppe almost exclusively covering the ground over large tracts of land. It appears from the rather rich material brought home by me from the Minusinsk district that it occurs in those regions in a multitude of varieties. From the diagnosis only of the numerous subspecies, varieties and forms belonging to this species, given by Domin, l. c., I dare not classify my material definitely. Some seemed to be intermediate forms, passing into the following species, and may possibly have to be regarded as hybrids between them. I have also observed this species in many places on the steppes on the river Ulu-kem.

Distribution: Over the greater part of Europe, except the northern and southern parts, temperate portions of Asia, Africa, North America.

Koeleria Delavignei Czern. *subspec.* **barabensis** Domin, Monograph. Gatt. *Koeleria* p. 249; Крыл. Фл. Алт. VII (1914) p. 1636.

Seemed to be of rare occurrence in the territory explored. A few specimens gathered by me in dry, sandy places on the Abakan Steppe, near Ust Kamuishto. With young flowers at the end of June.

Distribution: South-eastern Russia and western Siberia. *Subspec. barabensis* has previously been found only on dry steppes at Baraba in western Siberia.

Dactylis glomerata L. Spec. Pl. ed. II (1762) p. 105; Ledeb. Fl. Alt. I, p. 104; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 928; Ledeb. Fl. Ross. IV, p. 368; Крыл. Фл. Алт. VII (1914) p. 1644.

Scattered in dry meadows and in thickets on the islets in the rivers Yenisei and Abakan, in dry brush-wood at Kushabar, near Ust Algiac, at Ust Sisti-kem and Ust Tara-kem. The specimens gathered are distinguished by completely glabrous sheaths. The lower panicle-branches are comparatively long and spreading, thus giving the panicle a pyramidical appearance. The glumes are generally furnished with rather long, stiff hairs along the keel and the margin, whereby the specimens somewhat approach *f. ciliata* Peterm. Fl. Lips. (1838) p. 80. Spikelets of a light yellowish-green, a character which these specimens have in common with *f. flavescens* Schrøter, D. B. G. X. (1892) p. 132. Flowering in June and July.

Distribution: Europe, temperate portions of Asia, North Africa, North America (introduced).

Poa altaica Trin. in Mem. de l'Acad. de St. Petersb. Ser. VI, T. I, p. 382; Ledeb. Fl. Alt. I, p. 97; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 920; Turczan. Cat. Baical. no. 1320; Ledeb. Fl. Ross. IV, p. 373; Крыл. Фл. Алт. VII (1914) p. 1657.

In dry places, near Ust Sisti-kem.

Distribution: South-western and middle Asia.

Poa tianschanica (Regel) Hackel in Федченко, Фл. Памира (Act. Hort. Petropol. XXI, 1903) p. 441. *Poa macrocalyx* Traut. et Mey. Florula Ochotensis in Midd. Reise p. 103 *var. tianschanica* Regel, Descr. Pl. Nov. Fasc. VIII (Act. Hort. Petropol. VII, 1881) p. 619. [Tab. III, Fig. 1].

This characteristic and fine species, hitherto known only from Turkestan, and Pamir(Fedtschenko, l. c.), was collected by me in some places on the steppes about the Lower Abakan. In full flower at the end of June.

Distribution: Turkestan, Pamir, Siberia.

Poa annua L. Spec. Pl. ed. II (1762) p. 99; Ledeb. Fl. Alt. I, p. 95; Turczan. Cat. Baical. no. 1317; Ledeb. Fl. Ross. IV, p. 377; Turczan. Fl. Baical.-Dahur. (1856, I) p. 40, no. 1331; Крыл. Фл. Алт. VII (1914) p. 1649.

Rather common in the regions explored, along road-sides, in court-yards, etc., in settlements, and camps of gold-diggers in the Amyl taiga, where occurring in a multitude of different forms. A form with spikelets of a deep green occurring near Kushabar (f. *viridis* Leijeune et Courtois, Comp. Fl. Belg. I (1828) p. 80), and another one with broad, to 5 or 6 mm. broad leaves, in the Amyl taiga (f. *latifolia*).

Distribution: The species occurs nearly all over the globe.

subspec. **supina** (Schrad.) Reichenb. Fl. Germ. Excurs. I (1830) p. 46. *Poa supina* Schrad. Fl. Germ. I (1806) p. 289.

Rather common at Ust Algiac, on roads, in court-yards, etc. In full flower at the end of July.

Distribution: Western and northern Europe, Siberia, North Africa.

Poa Chaxii Villars, Fl. Delphinalis in Gilibert, Syst. Pl. Eur. I (1785) *subspec. remota* (Fries) Richt., Крыл. Фл. Алт. VII (1914) p. 1660. *Poa sudetica* Haenke, Reisen nach dem Riesengeb. (1891) p. 120; Ledeb. Fl. Ross. IV, p. 380.

In open brush-wood and in grass-grown places at Kushabar. Flowering in July.

Distribution: The species is distributed over Europe, south-western Asia, Siberia, and eastern Asia.

Poa irrigata C. A. M. Lindman in Botan. Notiser (1905) p. 73. *Poa humilis* Ehrh. Ind. Calam. no. 115, et Beitr. VI (1791) p. 84 p. p. *Poa rigens* Hartm. Handb. Skand. Fl. ed. I (1820) p. 448.

This species collected by me in moist meadows and swamps on the river Abakan, and on the islets in that river, near Askys, where of rather common occurrence. The specimens collected agree perfectly with authentic material, determined by the author himself. With young flowers in the first half of June.

Distribution: The species has first been indicated for Sweden. As it is also to be found in my material from southern Siberia, it must be supposed to be very widely distributed.

Poa nemoralis L. Spec. Pl. ed. II (1762) p. 102; Ledeb. Fl. Alt. I, p. 99; Turczan. Cat. Baical. no. 1321; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 924; Ledeb. Fl. Ross. IV, p. 375; Turczan. Fl. Baical.-Dahur. (1856, I) p. 40, no. 1330; Крыл. Фл. Алт. VII (1914) p. 1653.

In thickets at Kushabar and in the Amyl valley. In full flower in the first half of July.

Distribution: Europe, western and central Asia, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North America, Greenland.

Poa attenuata Trin. in Bunge, Verz. Suppl. Fl. Alt. (1830) p. 9; Trin. Gramin. Suppl. in Mem. de l'Acad. de St. Petersb. Ser. VI, T. IV, p. 64; Ledeb. Fl. Ross. IV, p. 371; Turczan. Fl. Baical.-Dahur. (1856, I) p. 37, no. 1326; Крыл. Фл. Алт. VII (1914) p. 1655. *Poa fertilis* Host in Ledeb. Fl. Alt. I, p. 98 ex parte. *Poa altaica* in Turczan. Cat. Baical. no. 1320.

Very common on the steppes near Minusinsk and about the river Abakan, where associated with *Koeleria gracilis,* covering large tracts of land. The specimens are 20 to 30 cm. high, the panicle about 0,5 to 1 cm. broad, with spikelets frequently of a brownish or light violet colour. Flowers not fully opened in the first half of June.

Distribution: Southern Siberia, south-western Asia, central Asia, northern Mongolia, the Amoor Province, Manchooria.

Poa palustris L. Syst. ed. X (1759) p. 874, Spec. Pl. ed. II (1762) p. 98; Крыл. Фл. Алт. VII (1914) p. 1657. *Poa fertilis* Host, Gram. Austr. III (1805) p. 10 ex parte; Ledeb. Fl. Alt. I, p. 98 ex parte; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 923. *Poa serotina* Ehrh. Beitr. VI (1791) p. 86; Turczan. Cat. Baical. no. 1322; Ledeb. Fl. Ross. IV, p. 375; Turczan. Fl. Baical.-Dahur. (1856, I) p. 39, no. 1329.

In the territory explored this species varies considerably both in breadth and roughness of the leaves, richness and density of the spikelets in the panicle, size of the spikelets, and number of the florets of each spikelet, varying from 2 to 6. Some of the specimens collected have the branches of the panicle very short, stiff and pointing upwards along the rachis, unbranched, each branch with one spikelet only, the plant thus assuming, in point of habitus, a much deviating appearance.

The species is common in the territory explored, in moist meadows, on the banks of small lakes and rivers.

On the banks of the river Abakan, near Askys, and on the islets in the river, between Minusinsk and Kushabar, the Amyl valley, Ust Algiac, Ust Sisti-kem, and at Ust Kamsara. In moist, grass-grown depressions on the Abakan Steppe I have collected a form furnished with long stolons. *(f. stolonifera)*

Distribution: The species is distributed over the greater part of northern and middle Europe, Italy, The Balkan Peninsula, Asia Minor, Caucasia, Siberia, northern Mongolia, central and eastern Asia, Sakhalin, Japan, North America.

Poa caesia Smith, Fl. Brit. (1800) p. 103; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 925; Ledeb. Fl. Ross. IV, p. 374.

In the Sayansk mountains, in moist places, above the tree limit, some specimens belonging to a very fine and slender form were collected by me. This form is separated by me as:

subspec. **esuriens** *nov. subspec.*

Caulibus tenuibus et subtilibus ab forma typica differens. Spiculae parvae, 2-2,5 mm. longae, fusco-violaceae, flosculos singulos vel binos in se continentes. Rami paniculae summae tenuitatis, capillacei, divaricati, valde scabri, flexuosi, 2 fere (vel rarius 1-3) spiculas pediculis longis singuli ferentes.

It is chiefly distinguished by having the spikelets very small, from 2 to 2,5 mm. long, each one containing 1 or 2 florets only. Panicle about 10 cm. long, rather rich in spikelets, rachis flexuous, rough, and furrowed, its branches capillaceous, from 2 to 3 in a whorl, of a greenish-violet colour, rough, spreading, flexuous, each branch generally with 1 to 2 dark, brownish-violet spikelets. Glumes nearly equally long, 2 mm. in length, tapering to a point, the upper one with 3, not very prominent nerves, greenish-violet, with a broad membranous margin of a violet hue, slightly rough

along the keel, for the rest smooth, not attaining the summit of the florets. The florets surrounded at the base by long, arachnoid hairs. Pales equally long, about 2 mm. in length, the lower one broad, ovate, rather subobtuse at the apex, with a membranous margin, 5-nerved, near the apex with a violet or yellowish-brown stain, in the lower half, along the keel, with long hairs. The upper pale is narrow, membranous, with a hairy margin, rounded at the apex, with a copper spot, so characteristic for the species. Culms caespitose, thin, slender, but erect and straight, from 20 to 30 cm. high, completely glabrous. Leaves to 2 mm. broad, like the narrow sheaths slightly rough, or nearly smooth, gradually finely pointed towards the summit. Ligules short, 0,5 mm. in length, truncate, or subobtuse.

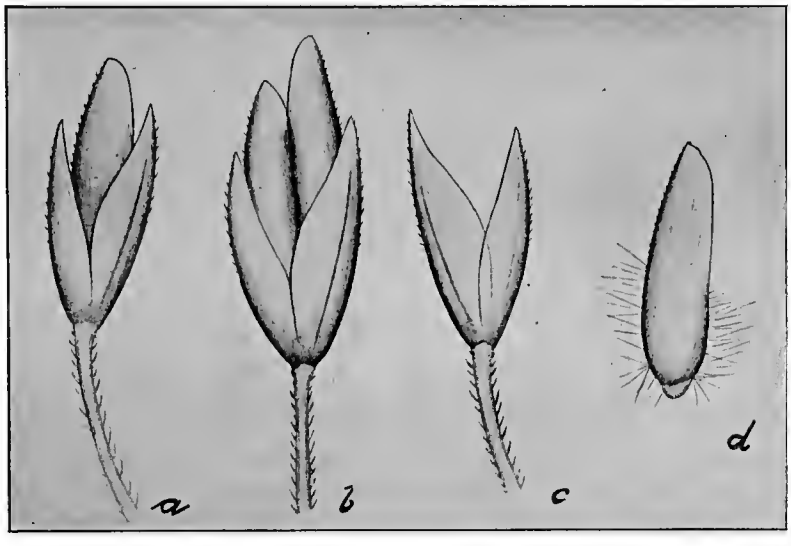

Fig. 75. *Poa caesia* SMITH subspec. *esuriens* nov. subspec.
a and b. Spikelets. — c. Glumes. — d. Floret.

In point of external habitus this plant somewhat resembles *Poa nemoralis var. montana*, but is distinguished by having marked ligules and the panicle-branches long, spreading, flexuous and very rough, the spikelets hardly one half as large, each one with 1 or 2 flowers only, the pales of which are rather oblique-truncate, obtuse at the apex, and the leaves more tapering to a point upwards.

In point of its small and reduced spikelets it may also somewhat resemble *Poa nemoralis var. michranta* HARTM.

Our plant also seemed to bear a rather close resemblance to *Poa Balfourii*, but differs distinctly from it by having the culms solitary, much higher and more slender, and with visible, uncovered nodes. The upper internode of the culm is not so much prolonged. The ligules are shorter, only about 0,5 mm. long, obtuse. The leaves are very narrow, nearly completely glabrous, from 5 to 7 cm. long. It differs from *Poa Balfourii* especially in the shape of the panicle and in the considerably greater floweriness. Thus, it is not contracted, but distinctly spread out, with very fine, flexuous, and scabrous

stalks, each one bearing 1 (rarely 2—3) spikelets. These spikelets have 1 or rarely 2 florets. The pales are also more obtuse at the apex than in the said species.

Distribution: *Poa caesia* is distributed over Europe, western, northern, and central Asia, America.

Poa sibirica Roschewitz in Извѣст. Императорск. С. Петербургск. Ботан. Сад. IV (1912) p. 121—123; Крыл. Фл. Алт. VII (1914) p. 1661. [Tab. III, Fig. 2].

In the specimens collected the sheaths are completely glabrous. Leaves from 2 to 4 mm. broad, flat or slightly channelled. Ligules, especially the upper ones, prominent, to 2 or 3 mm. long, the summit often somewhat subacute, and the margin sometimes toothed. Glumes of a greenish-violet colour, generally with white membranous margins. Taken with flowers in July. In meadows in woods near Kushabar, and at Ust Algiac, near the Sisti-kem.

Distribution: Siberia, northern Mongolia.

Poa trivialis L. Spec. Pl. ed. II (1762) p. 99; Ledeb. Fl. Alt. I, p. 96; Turczan. Cat. Baical. no. 1319; Ledeb. Fl. Ross. IV, p. 379; Turczan. Fl. Baical.-Dahur. (1856, I) p. 41, no. 1333; Крыл. Фл. Алт. VII (1914) p. 1662.

f. glabra Døll, Rhein. Fl. (1843) p. 92.

In moist meadows on islets in the Abakan, and on the Amyl, near Petropawlowsk.

f. vulgaris Reichenb. Iconogr. I, T. LXXXIX (1834) Fig. 1653; Aschers. et Graebn. Synops. Mitteleur. Fl. II (1898) p. 426.

In moist meadows and thickets on islets in the lower parts of the river Abakan.

subspec. **multiflora** Reichenb. Iconogr. l. c. Fig. 1655; Aschers. et Graebn. l. c. p. 427.

Common in meadows on the islets in the river Abakan, near Askys. The species flowers in June and July.

Distribution: Northern and middle Europe, the Mediterranean countries, south-western Asia, Siberia, eastern Asia, North America (introduced).

Poa alpigena (Fr.) Lindman, Svensk Fanerogamflora (1918) p. 91. *Poa pratensis var. alpestris* Anderss. Gram. Scand. (1852) p. 35. *Poa alpestris* (Anderss.) Lindman in herb. p. p.).

Seemed to be rather common in the regions about the river Abakan, where gathered by me in several places near Ust Kamuishto and Askys. In full flower in the second half of June. I have also collected it in the Urjankai country, at Ust Algiac.

The specimens agree perfectly with authentic materiel collected in Norway and determined by the author himself under the name of *Poa alpestris*.

Distribution: The species was formerly only recorded from Scandinavia and the Pyrenees (?).

Poa pratensis L. Spec. Pl. ed. II (1762) p. 99; Ledeb. Fl. Alt. I, p. 96; Turczan. Cat. Baical. no. 1323; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 919; Ledeb. Fl. Ross. IV, p. 378; Turczan. Fl. Baical.-Dahur. (1856, I) p. 41, no. 1332; Крыл. Фл. Алт. VII (1914) p. 1663.

Common in the territory explored, where occurring under many forms, the most frequent being:

f. vulgaris Gaud. Agrostolog. Helvetica I (1811) p. 212; Крыл. l. c. p. 1664.

Meadows and hills along the river Abakan, Kushabar, and Ust Algiac.

f. angustifolia Smith, Fl. Brit. (1800) p. 105; Крыл. l. c. p. 1664.

Rather common on the Abakan Steppe, and at Ust Algiac.

f. latifolia Weihe, Deutsche Gräser 31 M. u. K. D. Fl. I (1823) p. 612.

Common about Minusinsk, and on the river Abakan. The species flowers in June and July.

Distribution: The species is distributed over Europe, northern and temperate portions of Asia, North Africa, North America, Greenland.

Glyceria aquatica (L.) Wahlenb. Fl. Goth. (1820) p. 18; Ledeb. Fl. Ross. IV, p. 392; Turczan. Fl. Baical.-Dahur. (1856, I) p. 47, no. 1340; Крыл. Фл. Алт. VII (1914) p. 1668. *Glyceria spectabilis* Mert. u. Koch, Deutschl. Fl. I (1823) p. 586; Ledeb. Fl. Alt. I, p. 102; Turczan. Cat. Baical. no. 1301. *Glyceria remota* Fr. in Ledeb. Fl. Ross. IV, p. 391 ex parte.

subspec. **arundinacea** (M. Bieb.) Aschers. Fl. Brand. I (1864) p. 851; Крыл. l. c. p. 1668.

In swamps on the Abakan Steppe, near Askys. The specimens in bud, a very few only, with fully opened flowers in the middle of June. The species also collected by me in the Urjankai country, near Ust Tara-kem.

Distribution: Europe, Asia Minor, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan.

Atropis distans (L.) Griseb. in Ledeb. Fl. Ross. IV, p. 388; Turczan. Fl. Baical.-Dahur. (1856, I) p. 45, no. 1338; Крыл. Фл. Алт. VII (1914) p. 1670. *Glyceria distans* Wahlenb. Fl. Ups. (1820) p. 36; Ledeb. Fl. Alt. I, p. 102; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 913 *var.*

Very common on the borders of salt swamps on the Abakan Steppe, for instance at Ust Kamuishto, where I have taken it with young flowers at the end of June.

Distribution: Middle and northern Europe, temperate portions of Asia, North America.

Atropis tenuiflora Griseb. in Ledeb. Fl. Ross. IV, p. 389; Turczan. Fl. Baical.-Dahur. (1856, I) p. 46, no. 1339. *Glyceria distans* Wahlenb. *var. tenuiflora* Turczan., Regel in Act. Hort. Petropol. VII, p. 624.

Very common on the banks of the salt swamps on the Abakan Steppe, for instance at Ust Kamuishto, where forming loose tussocks, associated with the preceding one. With young flowers in the second half of June.

Distribution: Eastern Europe, temperate portions of Asia.

Festuca ovina L. Spec. Pl. ed. II (1762) p. 108; Ledeb. Fl. Alt. I, p. 107; Turczan. Cat. Baical. no. 1302; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 930; Ledeb. Fl. Ross. IV, p. 350; Turczan. Fl. Baical.-Dahur. (1856, I) p. 52, no. 1347; Крыл. Фл. Алт. VII (1914) p. 1672.

subspec. **sulcata** Hackel, Monogr. Festuc. Europ. (1882) p. 100. *Festuca Vallesiaca* Schleich., Ledeb. Fl. Ross. IV, p. 351.

Very common on the dry steppes about Ust Abakansk, where, in places, covering nearly sole prevailing large areas, or associated with *Koeleria gracilis* and *Poa attenuata*. The species flowers in June.

subspec. **supina** Hackel, l. c. (1882) p. 88.

Rather common in the subalpine and alpine regions of the Altaian.

Distribution: Arctic and temperate portions of Europe and Asia, North Africa, North America, Australia, New Zealand.

Festuca rubra L. Spec. Pl. ed. II (1762) p. 109; Ledeb. Fl. Alt. I, p. 108; Ledeb. Fl. Ross. IV, p. 352; Turczan. Fl. Baical.-Dahur. (1856, I) p. 53, no. 1348; Крыл. Фл. Алт. VII (1914) p. 1676.

Scattered in dry places on the Abakan Steppe, where occurring under different forms. The colour of the spikelets varies between yellowish-green and violet, and the number of florets of each spikelet from 3 to 9.

f. arenaria (Osbeck) Fr. Fl. Halland. (1818) p. 28; Крыл. l. c. p. 1676.

Accompanying the preceding one on the Abakan Steppe, where apparently more frequent than the main species. Each spikelet contains rather few florets, generally from 3 to 5, most frequently 4, and the panicle is rather slender and relaxed.

f. grandiflora Hackel, Monogr. Festuc. Europ. (1882) p. 138.

The specimens belonging to this form, collected by me, are distinguished by their large spikelets, to 18 mm. long, each spikelet with to 15 florets. The awn is rather long, the glumes only slightly hairy. Dispersed on the Abakan Steppe, near Askys. The species flowers in June in those regions.

Distribution: The species is distributed over Europe, northern and temperate portions of Asia, North Africa, North America, Greenland.

Festuca pratensis Huds. Fl. Angl. ed. I (1762) p. 37; Крыл. Фл. Алт. VII (1914) p. 1677. *Festuca elatior subspec. pratensis* Hackel, Monogr. Festuc. Europ. (1882) p. 150. *Festuca elatior* L. Spec. Pl. ed. II (1762) p. 111 ex parte; Ledeb. Fl. Alt. I, p. 109; Turczan. Cat. Baical. no. 1307; Ledeb. Fl. Ross. IV, p. 353; Turczan. Fl. Baical.-Dahur. (1856, I) p. 53, no. 1349.

In meadows and in thickets on the islets in the river Abakan, and in several places between Minusinsk and Kushabar, in dry meadows. The species flowers in July.

Distribution: Europe, south-western Asia, Siberia, North Africa, America (introduced).

Festuca gigantea (L.) Vill. Hist. Pl. Dauph. II (1787) p. 110; Hackel, Monogr. Festuc. Europ. (1882) p. 159; Ledeb. Fl. Alt. I, p. 108; Ledeb. Fl. Ross. IV, p. 354; Крыл. Фл. Алт. VII (1914) p. 1679.

In thickets on the river Amyl, near Petropawlowsk. Flowering in the middle of July.

Distribution: North-eastern and middle Europe to northern Spain and Switzerland, central Italy, Serbia, south-western and central Asia, Siberia, eastern Asia to northern Corea, Sakhalin, tropical Africa, and North America (introduced).

Festuca altaica Trin. in Ledeb. Fl. Alt. I, p. 109; Turczan. Cat. Baical. no. 1306; Ledeb. Fl. Ross. IV, p. 354; Turczan. Fl. Baical.-Dahur. (1856, I) p. 54, no. 1351; Крыл. Фл. Алт. VII (1914) p. 1680.

In the Altaian, in alpine situations, among moss and ling, at altitudes of about 2000 m. above sea-level. The lower leaf-sheaths of a pretty violet hue, the glumes violet. Specimens taken at the end of July with fully opened florets.

Distribution: South-western Asia, Siberia, and northern Mongolia.

Bromus inermis Leyss. Fl. Hal. ed. I (1761) p. 16; Ledeb. Fl. Alt. I, p. 111; Turczan. Cat. Baical. no. 1308; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 936; Ledeb. Fl. Ross. IV, p. 357; Turczan. Fl. Baical.-Dahur. (1856, I) p. 56, no. 1353; Крыл. Фл. Алт. VII (1914) p. 1683.

f. typicus Beck, Fl. Nieder-Oesterr. (1890) p. 106; Крыл. l. c. p. 1683.

Common on the islets in the river Abakan, near Ust Kamuishto, in meadows and in thickets; in the Urjankai country, near Ust Sisti-kem, Ust Kamsara, Ust Tara-kem, and on the steppes on the Ulu-kem.

f. pellitus Beck, l. c. (1890) p. 106.

The specimens referred to this form, are distinguished by their broad leaves, to 11 mm. broad. The leaves scattered pubescent above, and the nodes, especially in the lower parts of the plant, with short, silky hairs. The glumes are always completely glabrous. The pedicels slightly rough. Near Ust Abakansk, on the islets in the river.

f. aristatus Schur, Enum. Pl. Transsilv. (1866) p. 805; Крыл. l. c. p. 1683.

In my collections are only a few specimens belonging to this form, taken on an islet in the river Abakan, about half way between Ust Kamuishto and Ust Abakansk, and near Ust Abakansk. The specimens are distinguished by panicles with few and scattered spikelets; the panicle-branches unramified, each branch bearing one spikelet only, generally containing from 2 to 5 florets, so as to approach *f. pauciflorus* Rohlena. The glumes, of a greenish violet hue, with a markedly brown membranous margin, are slightly hairy, especially so along the nerves and the margin. The awn brownish, from 2 to 4 mm. long. The species begins flowering at the end of June.

Distribution: The species is distributed over northern and middle Europe, Russia, Siberia, the Caucasus, south-western and central Asia, northern Mongolia, China, North America (introduced).

Brachypodium pinnatum (L.) P. de Beauv. Ess. Agrostograph. (1812) p. 155; Ledeb. Fl. Ross. IV, p. 345; Крыл. Фл. Алт. VII (1914) p. 1686. *Bromus pinnatus* L. Spec. Pl. ed. II (1762) p. 115; Ledeb. Fl. Alt.I, p. 112. *Triticum macrourum* Turczan. Cat. Baical. no. 1328; Turczan. Fl. Baical.-Dahur. (1856, I) p. 59, no. 1357.

In dry thickets, near the mouth of the river Sisti-kem, and at Ust Tara-kem. Nearly done flowering at the beginning of August.

Distribution: Europe, except the extreme north, Siberia, northern Mongolia, south-western Asia, North Africa.

Triticum caninum L. Spec. Pl. ed. I (1753) p. 86; Schreb. Spicilegium Fl. Lipsicae (1771) p. 51; Ledeb. Fl. Ross. IV, p. 340; Turczan. Fl. Baical.-Dahur. (1856, I) p. 58, no. 1356. *Agropyrum caninum* (L.) P. de Beauv. Ess. Agrostograph. (1812) p. 146; Крыл. Фл. Алт. VII (1914) p. 1690.

subspec. **altaicum** Ledeb. l. c. p. 340; Крыл. l. c. p. 1691. *Triticum repens* α Ledeb. Fl. Alt. I, p. 117.

In dry thickets on the river Abakan, near Askys. Young, not yet fully opened flowers in the second half of June.

Distribution: Siberia.

subspec. **geniculatum** (Trin.) Regel, Descr. Pl. Novar. etc. Fasc. VIII, p. 592 (sub *Tritico). Triticum geniculatum* Trin. Ledeb. Fl. Alt. I, p. 117; Ledeb. Fl. Ross. IV, p. 342. *Triticum pubescens* Trin. et *Triticum Bungeanum* Trin. in Bunge, Enum. Alt. No. 35 et 37. *Agropyrum caninum* (L.) R. et Sch. *f. geniculatum* (Trin.) Regel, Крыл. Фл. Алт. VII (1914) p. 1691. *Agropyrum geniculatum* (Trin.) Roshew. — въ Федченко, Списокъ Русскихъ Раст. XXI.

Very markedly distinguished from the typical species by its shorter awn and narrow and conduplicated leaves. The lower parts of the culm generally geniculate. Rather common on steppes and dry sloping mountains about the river Abakan. With young flowers in the second half of June.

Distribution: Siberia.

Triticum repens L. Spec. Pl. ed. II (1762) p. 128; Ledeb. Fl. Alt. I, p. 116; Turczan. Cat. Baical. no. 1327; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 943; Ledeb. Fl. Ross. IV, p. 340; Turczan. Fl. Baical.-Dahur. (1856, I) p. 59, no. 1358. *Agropyrum repens* P. de Beauv. Ess. Agrostograph. (1812) p. 146 Крыл. Фл. Алт. VII (1914) p. 1692.

subspec. **vulgare** Døll, Fl. Bad. (1857) p. 128; Крыл. l. c. p. 1692 (sub *Agropyro).*

Scattered on the Abakan Steppe, and on the steppes about Minusinsk. With young flowers in June.

subspec. **aristatum** Døll, l. c. p. 128; Крыл. l. c. (sub *Agropyro).*

In dry meadows, and on islets in the lower parts of the river Abakan. With young flowers in June.

Distribution: The species is distributed over Europe, Siberia, northern Mongolia, south-western and central Asia, eastern Asia, North Africa, North America (introduced).

Triticum Gmelini (Ledeb.) nov. nom. *Triticum strigosum* Less. var. *Gmelini* Ledeb. Icon. Fl. Ross. tab. 248, p. 16. *Agropyrum Gmelini* (Ledeb.) Krylow, Фл. Алт. VII (1914) p. 1695. *Triticum caninum* in Ledeb. Fl. Alt. 1, p. 118 cum var. *Gmelini* Turczan. Cat. Baical. no. 1329 ex parte.

In dry meadows, and on the slopes on the Abakan Steppe, near Ust Kamuishto. Young flowers, not yet fully opened, in the second half of June.

Distribution: The Crimea, south-western Asia, Siberia, northern Mongolia.

Triticum ramosum Trin. in Ledeb. Fl. Alt. I, p. 114; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 941; Ledeb. Fl. Ross. IV, p. 343. *Agropyrum ramosum* (Trin.) Richt., Крыл. Фл. Алт. VII (1914) p. 1696.

In a dry, sandy meadow on an islet in the river Abakan, near Ust Kamuishto.

Distribution: South-eastern Russia, Trans Caspia, Siberia.

Triticum cristatum (L.) Schreb. Gram. II (1779) Tab. 23, Fig. 2; Ledeb. Fl. Alt. I, p. 113; Turczan. Cat. Baical. no. 1326; Karel. et Kiril. Pl. Fl. Alt. no. 940; Ledeb. Fl. Ross. IV, p. 337; Turczan. Fl. Baical.-Dahur. (1856, I) p. 57, no. 1354. *Agropyrum cristatum* Bess., Крыл. Фл. Алт. VII (1914) p. 1699.

subspec. **imbricatum** (M. Bieb.) Aschers. et Graebn. Synops. Mitteleur. Fl. (1901) p. 669.

f. **abakanense** nov. f.

Glumis distincta basi latissimis superne sensim cuneiforme attenuatis, et in aristam longiorem saepius paululum recurvatam productis.

The lower pale is 8—9 mm. long, the upper one only ½ to ⅔ as long as the lower one. It is especially the structure of the glumes and the great difference in the size of the 2 pales by which this form is characterized. But, on account of the scarce material I have had at my disposal, I cannot express any opinion on the constancy or systematic value of these characters. Each spikelet generally contains 4 florets. On sandy soil on the Abakan Steppe, near Askys, and in the neighbourhood of Ust Abakansk, and also in the Urjankai country on the rivers Sisti-kem, Tara-kem, and Kamsara. Scattered on the steppes on the Ulu-kem.

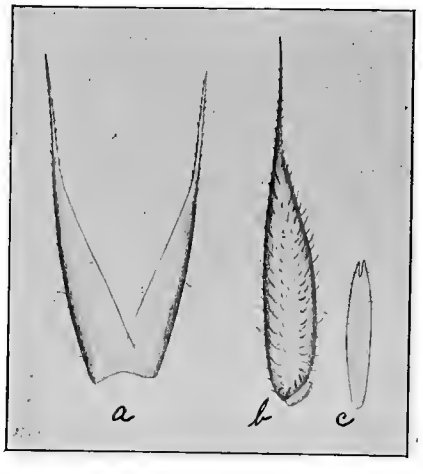

Fig. 76. *Triticum cristatum* (L.) Schreb. f. *abakanense* nov. f. (6/1). a. Glumes. b. Lower pale. -- c. Upper pale.

Distribution: Southern Europe, western Asia, southern Siberia eastwards to Trans Baikal, northern Mongolia.

Triticum pseudo-Agropyrum Griseb. in Ledeb. Fl. Ross. IV, p. 343. *Agropyrum pseudo-Agropyrum* (Trin.) Franchet David. p. 340. *Elymus pseudo-Agropyrum* Trin. Turczan. Cat. Baical. no. 1343; Turczan. Fl. Baical.-Dahur. (1856, I) p. 63, no. 1364.

Common in dry, sandy places on the Abakan Steppe, near the river. With young flowers in the middle of June.

Distribution: Eastern Siberia, eastern Mongolia, Manchooria.

Hordeum secalinum Schreb. Spicilegium Fl. Lipsicae (1771) p. 148; Ledeb. Fl. Alt. I, p. 123; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 951. *Hordeum pratense* Huds. Fl. Angl. ed. II (1778) p. 56; Ledeb. Fl. Ross. IV, p. 328; Turczan. Fl. Baical.-Dahur. (1856, I) p. 60, no. 1359.

In meadows near Askys. Taken with young flowers in the middle of June.

subspec. **brevisubulatum** Trin., Крыл. Фл. Алт. VII (1914) p. 1703.

Very common about the river Abakan, in grass-grown places, frequently accompanying *Cypripedilum macranthum, Herminium Monorchis,* etc. Taken with young flowers in the second half of June.

Distribution: The species is distributed over Europe, except the northern portions, temperate Asia, Africa, North and South America.

Elymus sibiricus L. Spec. Pl. ed. II (1762) p. 123; Ledeb. Fl. Alt. I, p. 123; Turczan. Cat. Baical. no. 1330; Ledeb. Fl. Ross. IV, p. 330; Turczan. Fl. Baical.-Dahur. (1856, I) p. 61, no. 1360; Крыл. Фл. Алт. VII (1914) p. 1705.

Rather common in meadows, etc., near the Upper Bei-kem and at Ust Tara-kem. With ripe fruits at the end of August.

Distribution: Eastern Russia, southern Siberia, northern Mongolia, central and eastern Asia, Sakhalin.

Elymus dahuricus Turczan. Cat. Baical. no. 1331; Ledeb. Fl. Ross. IV, p. 331; Turczan. Fl. Baical.-Dahur. (1856, I) p. 61, no. 1361; Крыл. Фл. Алт. VII (1914) p. 1707.

In meadows on the river Abakan, near Ust Abakansk, with young flowers at the end of June.

Distribution: Southern Siberia, central and eastern Asia.

Elymus dasystachys Trin. in Ledeb. Fl. Alt. I, p. 120 ex parte; Turczan. Cat. Baical. no. 1333; Ledeb. Fl. Ross. IV, p. 333 ex parte; Turczan. Fl. Baical.-Dahur. (1856, I) p. 62, no. 1363; Крыл. Фл. Алт. VII (1914) p. 1708.

In dry, sandy places on the right bank of the river Abakan, near Ust Abakansk, on somewhat saliferous soil, near Ust Kamuishto, and in the Urjankai country, on the river Tapsa.

Distribution: Eastern Russia, southern Siberia, south-western and central Asia, northern Mongolia.

Elymus salsuginosus Turczan. Pl. Exsicc.; Крыл. Фл. Алт. VII (1914) p. 1709. *Elymus dasystachys* Trin. *γ salsuginosus* (Turczan.) Griseb. in Ledeb. Fl. Ross. IV, p. 333; Turczan. Fl. Baical.-Dahur. (1856, I) p. 63, no. 1363. *Elymus dasystachys* Trin. b. Ledeb. Fl. Alt. I, p. 120; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 937.

Accompanying the preceding one at Ust Abakansk. Young flowers at the end of June.

Distribution: Eastern Russia, southern Siberia, south-western Asia, north-western Mongolia.

Elymus junceus Fisch. in Mem. de la Soc. des Naturlists de Moscou I (1811) p. 45; Ledeb. Fl. Alt. I, p. 119; Bunge, Enum. Alt. p. 7; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 945; Ledeb. Fl. Ross. IV, p. 333; Крыл. Фл. Алт. VII (1914) p. 1711.

In dry meadows, among dry sand, etc., rather common about Minusinsk and near Tagarski osero. Taken with flowers at the end of June and the beginning of July. Observed with fruits at Tapsa at the end of August.

Distribution: South-eastern Russia, southern Siberia, Trans Caspia, Turkestan, Afghanistan, northern Mongolia.

Elymus giganteus Vahl, Symbolae Bot. 3 (1794) p. 10; Ledeb. Fl. Alt. I, p. 122; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 950; Ledeb. Fl. Ross. IV, p. 332. *Elymus sabulosus* M. Bieb. *γ giganteus* (Vahl) Schmalh. Фл. Сред. и Южн. Росс. II, p. 667; Крыл. Фл. Алт. VII (1914) p. 1708.

In sandy places on the Abakan Steppe, and in dry thickets near the river, at Askys. Taken with young flowers in the middle of June. At Ust Tara-kem and on the Bei-kem, near the Dora Steppe, with fruits in the middle of August.

Distribution: South-eastern Russia, southern Siberia, Caucasia, Trans Caspia, Turkestan, northern Mongolia.

Cyperaceae St. Hilaire.

Carex obtusata Liljebl. in Vet.-Akad. Handl. (1793) p. 69; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 87; Ledeb. Fl. Ross. IV, p. 267; Turczan. Fl. Baical.-Dahur. (1855, II) p. 323, no. 1223; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 36; Крыл. Фл. Алт. VI (1912) p. 1461. *Carex microcephala* C. A. Meyer in Ledeb. Fl. Alt. IV, p. 205. *Carex decipiens* Turczan. Cat. Baical. no. 1212.

In open wood of foliferous trees, in sandy places near Tagarski osero.

Distribution: Sweden, Germany, Russia, Caucasia, Siberia, Manchooria, North America.

Carex pauciflora Lightf. Fl. Scot. II (1777) p. 543; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 110; Ledeb. Fl. Ross. IV, p. 268; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 40; Крыл. Фл. Алт. VI (1912) p. 1462.

Rather common in *Sphagnum*-bogs in the Amyl taiga, in the Altaian, and at Ust Algiac, where collected by me with nearly ripe fruits in the second half of July.

Distribution: Europe, Siberia, northern Mongolia, Sakhalin, Asia Minor, North America.

Carex stenophylla Wahlenb. in Vet.-Akad. Handl. (1803) p. 142; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 120; Ledeb. Fl. Alt. IV, p. 208; Turczan. Cat. Baical. no. 1217; Ledeb. Fl. Ross. IV, p. 270; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 46; Turczan. Fl. Baical.-Dahur. (1855, II) p. 324, no. 1226; Крыл. Фл. Алт. VI (1912) p. 1463.

Very common in dry, sandy meadows on the islets in the rivers Yenisei and Abakan as well as on the steppes in the neighbourhood, here and there accompanying *Carex supina* Wahlenb. The species varies rather much in the length of the culms, the length and breadth of the leaves, the floweriness and density of the spike, and there seemed to occur intermediate forms between this one and the following subspecies, especially in the structure of the spike. The perigynia, now and then completely destitute of nerves, are, by the way, sometimes shorter, sometimes longer than the broad, lanceolate glumes, which are furnished with a membranous margin, and a distinct dorsal midnerve, frequently prolonged into a shorter or longer point. Taken flowering and with ripe fruits in June.

Distribution: Middle and south-eastern Europe, temperate portions of Asia, southwards to the Himalayas, eastern Asia, North America.

subspec. **enervis** (C. A. Meyer) Kükenth. l. c. (1909) p. 122; Крыл. Фл. Алт. VI (1912) p. 1464. *Carex enervis* C. A. Meyer in Ledeb. Fl. Alt. IV, p. 209; Ledeb. Fl. Ross. IV, p. 272.

In dry, sandy meadows on an islet in the Yenisei, near Ust Abakansk.

Distribution: Middle Asia.

Carex curaica Kunth, Enum. Pl. II (1837) p. 375; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 124; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 47; Крыл. Фл. Алт. VI (1912) p. 1465. *Carex ovata* C. A. Meyer in Ledeb. Fl. Alt. IV, p. 207; Turczan. Cat. Baical. no. 1222; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 888. *Carex incurva* Lightf. *β* Trev. in Ledeb. Fl. Ross. IV, p. 270. *Carex curaica α latifolia* in Turczan. Fl. Baical.-Dahur. (1855, II) p. 326, no. 1228. *Carex borotalicola* Regel in Act. Hort. Petropol. VII (1880) p. 566.

In moist, subalpine meadows near the Algiac Pass as well as on the moist bank of the river, near Ust Algiac and Ust Tara-kem. The specimens flowering and with ripe fruits in the middle of July.

Distribution: Turkestan, Dzungaria, Siberia, Japan.

Carex praecox Schreb. (non Jacq.) Spic. Fl. Lips. (1771) p. 63; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 129; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 49; Крыл. Фл. Алт. VI (1912) p. 1466. *Carex brizoides α campestris* Wimm. Fl. Schles. ed. II (1844) 1, p. 401; Ledeb. Fl. Alt. IV, p. 210; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 889; Ledeb. Fl. Ross. IV, p. 284.

In thickets of foliferous trees, near the banks of the river Abakan, at Askys. The specimens in full flower in the middle of June.

Distribution: Europe, except the northern parts, Siberia, Manchooria, Corea.

Carex diandra Schrank in Acta Acad. Mogunt. (1782) p. 49; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 175; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 57; Крыл. Фл. Алт. VI (1912) p. 1471. *Carex teretiuscula* Good. in Trans. Linn. Soc. II (1794) p. 163; Ledeb. Fl. Ross. IV, p. 276.

In swampy grass-field, south of Minusinsk, on the way to Kushabar. With flowers and fruits at the beginning of July.

Distribution: Northern and middle Europe, Siberia, North Africa, North America, New Zealand.

Carex cyperoides L. Syst. Veget. ed. XIII (1774) p. 703; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 191; Ledeb. Fl. Alt. IV, p. 206; Turczan. Cat. Baical. no. 1215; Ledeb. Fl. Ross. IV, p. 271; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 60; Turczan. Fl. Baical.-Dahur. (1855, II) p. 326, no. 1229; Крыл. Фл. Алт. VI (1912) p. 1473.

On the borders of a swamp, near the road between Karatus and Kushabar. Specimens taken in the middle of July, are past flowering.

Distribution: Middle Europe, western Asia, southern Siberia to the Amoor Province and Manchooria.

Carex intermedia Good. in Trans. Linn. Soc. II (1794) p. 154; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 135; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 51; Ledeb. Fl. Alt. IV, p. 210; Turczan. Cat. Baical. no. 1226; Ledeb. Fl. Ross. IV, p. 273; Turczan. Fl. Baical.-Dahur. (1855, II) p. 327, no. 1230; Крыл. Фл. Алт. VI (1912) p. 1468.

Rather common on the islets in the river Abakan, especially in moist, sandy meadows, in thickets, etc., where flowering in the second half of June. The material collected is rather polymorphous. According to the structure of the spike, the following forms may be separated: *f. distachya* Lang., *f. permixta* Beck, *f. pangyna* Beck, and *f. longibracteata* Schleich.

Distribution: Northern and middle Europe, Siberia, central and eastern Asia.

Carex leporina L. Spec. Pl. ed. II (1763) p. 1381; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 210; Ledeb. Fl. Ross. IV, p. 278; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 62; Turczan. Fl. Baical.-Dahur. (1855, II) p. 330, no. 1236; Крыл. Фл. Алт. VI (1912) p. 1474.

Common on moist river-banks, and in moist thickets on the islets in the rivers Yenisei and Abakan, as well as in swampy, grass-grown places in depressions on the Abakan Steppe, near Askys. It appears from the rather rich material collected by me,

that it differs in various respects from the ordinary type of this species. The root is generally rather much prolonged in a root-stocklike manner, the culms growing in tufts, to 50 cm. high, thin and slender, relaxed, triangular, slightly rough towards the apex. The leaves are narrow, only to 2 mm. broad, mostly of the same length as the culm, or somewhat longer, slightly rough. The spike is generally formed from slightly separated spikelets, ovate, or more commonly, longer, nearly cylindrical. The shape of each flower agrees, for the rest, with the typical species.

Distribution: Europe, western and northern Asia, North Africa, eastern parts of North America, New Zealand.

Carex canescens L. Spec. Pl. ed. II (1763) p. 1383; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 216; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 66; Meinsh. *Cyperac.* p. 329; Turczan. Cat. Baical. no. 1223; Ledeb. Fl. Ross. IV, p. 280; Turczan. Fl. Baical.-Dahur. (1855, II) p. 330, no. 1238; Крыл. Фл. Алт. VI (1912) p. 1475. *Carex curta* Good., Ledeb. Fl. Alt. IV, p. 211.

Rather common in the subalpine woods between Kushabar and Ust Algiac, where occurring in moist soil, here and there in peat-bogs.

Some specimens have the lowest bract foliaceous, well developed, frequently equalling the apex of the terminal spike, or a little longer. In the Altaian, growing on the mountains to above the limit of tree vegetation. Taken with nearly ripe fruits at the end of July.

Distribution: Europe, Siberia, eastern Asia, central Asia, Sakhalin, Japan, Greenland, North and South America, Australia.

subspec. **subloliacea** Laest. in Hartm. Handb. Skand. Fl. ed. IV (1843) p. 299; Kükenth. l. c. p. 217. *Carex gracilis* Meinsh. in Act. Hort. Petropol. XVIII (1901) p. 328 ex parte.

In my collection there occurs only one specimen of this one, taken on the Upper Sisti-kem, at the end of July. With nearly ripe fruits.

Distribution: Northern Scandinavia, northern Mongolia, Sakhalin, North America.

Carex tenella Schkuhr, Riedgr. I (1801) p. 23; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 223; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 69; Крыл. Фл. Алт. VI (1912) p. 1478.

I have only few specimens of this one in my collection, taken in swampy, shady, moss-grown places, near Ust Algiac, at an altitude of about 900 m. above sea-level. The specimens bear ripe fruits, sometimes fallen off at the end of July. The perigynia of a brownish colour, much swollen, about 1½ mm. broad, and 2 mm. long.

Distribution: Subarctic Europe, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North America.

Carex loliacea L. Spec. Pl. ed. II (1763) p. 1382; Turczan. Cat. Baical. no. 1218; Ledeb. Fl. Ross. IV, p. 281; Turczan. Fl. Baical.-Dahur. (1855, II) p. 331, no. 1239;

Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 225; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 71; Крыл. Фл. Алт. VI (1912) p. 1480. *Carex sibirica* Spreng., Ledeb. Fl. Alt. IV p. 212.

Scattered in humid places, peat-bogs, etc., in the subalpine taiga territory, between Kushabar and Ust Algiac.

Distribution: Northern and middle Europe, Siberia, northern Mongolia, eastern Asia.

Carex tenuiflora Wahlenb. in Vet.-Akad. Handl. XXIV (1803) p. 147; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 224; Turczan. Cat. Baical. no. 1219; Ledeb. Fl. Ross. IV, p. 282; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 70; Turczan. Fl. Baical.-Dahur. (1855, II) p. 311, no. 1240; Крыл. Фл. Алт. VI (1912) p. 1479.

Scattered in subalpine woods about the river Amyl, as well as near Ust Algiac, in moist, mossy soil. With ripe fruits in the second half of July.

Distribution: Subarctic Europe and Asia, North America.

Carex rigida Good. in Trans. Linn. Soc. II (1794) p. 193; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 299; Meinsh. in Act. Hort. Petropol. XVIII (1901) p. 336 ex parte; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 81; Крыл. Фл. Алт. VI (1912) p. 1482. *Carex saxatilis* Wahlenb., Ledeb. Fl. Alt. IV, p. 223 ex parte; Bunge, Enum. Alt. p. 83; Turczan. Cat. Baical. no. 1246; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 896; Ledeb. Fl. Ross. IV, p. 309 ex parte; Turczan. Fl. Baical.-Dahur. (1855, II) p. 338, no. 1250.

In grassy and moss-grown places in the Altaian. The specimens are characteristic in having the glumes equalling the perigynia, or, frequently, even longer, rather narrow and acuminate, completely black, not wing-margined, arched in a boat-shaped way, with a more or less distinct dorsal nerve. The dorsal nerve is never of a light, but of a dark colour, like the glume. The spikes are rather loosely flowered, the lower one rather distant and long-stalked. The leaves are of about the same length as the culms. It recalls var. *infuscata*, according to the description in Drejer, Revis. Caric. Bor. (1841) p. 43, taken in north-eastern Siberia, on the rivers Lena and Kolyma. I have had no opportunity of comparing with authentic material, and therefore dare not definitely refer it to this one.

Distribution: Northern and middle Europe, northern and central Asia, arctic America.

Carex aquatilis Wahlenb. in Vet.-Akad. Nya Handl. XXIV (1803) p. 165; Kükenth. *Cyper. Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 309; Ledeb. Fl. Ross. IV, p. 312; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 83; Крыл. Фл. Алт. VI (1912) p. 1484.

On the banks of the river Algiac, near Ust Algiac. In flower and incipient fruit formation at the end of July.

Distribution: Arctic and subarctic Europe, Siberia, northern Mongolia, North America, Greenland.

Carex gracilis Curt. Fl. Londin. IV (1777—87) p. 282; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 319; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 86; Крыл. Фл. Алт. VI (1912) p. 1485. *Carex acuta* Good. in Trans. Linn. Soc. II (1794) p. 203; Ledeb. Fl. Alt. IV, p. 222; Turczan. Cat. Baical. no. 262; Ledeb. Fl. Ross. IV, p. 313; Meinsh. in Act. Hort. Petropol. (1901) p. 335.

Very common on the banks of the rivers Yenisei and Abakan, as well as on the banks of the Sisti-kem, near Ust Algiac. Taken flowering in June, and with ripe fruits in July.

subspec. **tricostata** (Fries) Aschers. Fl. Brandenb. I (1864) p. 776; Kükenth. l. c. (1912) p. 86. *Carex tricostata* Fries, Nov. Mant. III (1842) p. 152. *Carex gracilis f. erecta* Kükenth. in Allg. Bot. Zeitschr. III (1897) p. 170.

In moist, grass-grown places on the river Abakan, near Ust Kamuishto. Flowering and with young fruits in the second half of June.

Distribution: The species is distributed all over Europe, except the extreme northern regions, northern and western Asia, northern Mongolia, North Africa.

Carex Goodenoughii Gay in Ann. Sc. Nat. II, Ser. XI (1839) p. 191; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 313; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 84; Крыл. Фл. Алт. VI (1912) p. 1490. *Carex vulgaris f. communis et f. sabulosa* Meinsh. in Act. Hort. Petropol. (1901) p. 333. *Carex vulgaris* Fries, Nov. Mant. III (1842) p. 153; Ledeb. Fl. Ross. IV, p. 311.

Very common on the banks of the rivers Yenisei and Abakan, frequently together with the preceding one. Not unfrequently there occur specimens with a long-stalked pistillate spike starting from the base *(f. basigyna* Reichenb.*)* Flowering and with young fruits in June.

Distribution: All over Europe, Siberia, Mongolia, eastern Asia, North and South America, Greenland.

subspec. **tornata** Fries, Nov. Mant. III (1842) p. 154; Kükenth. l. c. (1909) p. 316.

Occurring together with the typical species on the banks of the river Abakan, near Askys. With flowers in the middle of June.

Distribution: Together with the main species.

Carex Goodenoughii Gay × **Carex gracilis** Curt, Kükenth. in Aschers. et Graebn. Synops. Mitteleur. Fl. II, 2 (1902) p. 99; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 373.

Generally accompanying the main species. The perigynia frequently sterile. The intermediate forms seemed sometimes to approach one, sometimes the other of the parents, and at times to be intermediate between them.

Carex caespitosa L. Spec. Pl. ed. II (1763) p. 1388; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 328; Ledeb. Fl. Alt. IV, p. 222; Turczan. Cat. Baical. no. 1263; Ledeb. Fl. Ross. IV, p. 310; Turczan. Fl. Baical.-Dahur. (1855, II) p. 337, no. 1248; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 90; Крыл. Фл. Алт. VI (1912) p. 1489.

Very common in the territory explored, where occurring in a multitude of rather different forms, which hardly posses any systematical value, connected as they are by intermediate forms. Frequent in moist places on the rivers Yenisei, Abakan, and Amyl. Near Ust Algiac, in moist meadows and swamps in woods, I have gathered a well-grown, vigorous form, with culms from 80 to 90 cm. high, with 1 staminate spike, and 2 to 3 pistillate spikes, about 2 cm. long, and from 0,5 to 0,6 cm. broad, of which the lower one is shortly stalked, the upper one or the upper ones sessile. Growing in large tussocks, from 0,5 to 1 m. high. This one may be identical with *f. major*, Peterm. in Flora XXV (1844) p. 33.

Distribution: Northern and middle Europe, south-western Asia, Siberia, northern Mongolia, eastern Asia.

Carex Goodenoughii Gay × **Carex caespitosa** L., Appel, in Jahresber. Schles. Ges. (1892) p. 158; Kükenth. *Cyper.-Caricoid.* l. c. (1909) p. 377.

Scattered among both the main species on the islets in the river Abakan, near Askys. Perigynia empty.

Distribution: Previously observed in northern Europe.

Carex atrata L. Spec. Pl. ed. II (1763) p. 1386; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 396; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 107; Ledeb. Fl. Alt. IV, p. 214; Turczan. Cat. Baical. no. 1229; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 891; Ledeb. Fl. Ross. IV, p. 287; Turczan. Fl. Baical.-Dahur. (1855, II) p. 336, no. 1247; Крыл. Фл. Алт. VI (1912) p. 1495.

Of rather frequent occurrence in the Altaian, at a height of about 2000—2200 m. above sea-level, where taken by me with young fruits at the end of July. The specimens collected seemed in many respects to approach *Carex nigra* All., especially so in their narrower leaves, only 2 to 3 mm. broad, moreover, in their spikes densely congested in a head, consisting of 3 to 4 rather coarse, ovoid spikes, which are more or less erect, and very shortly stalked. The lower stalks are generally from 2 to 3 mm. long, the upper spikes sessile, or nearly so. The bracts are shorter, sometimes nearly setaceous, never reaching above the summit of the head. The glumes are shorter than the perigynia, to equalling them, never longer, a character recalling *Carex nigra*. The perigynia

are of a dark brown, to quite black. These specimens may also resemble var. *rectiuscula* HARTM. in their congested spikes, but differ very distinctly from this one in having the spikes rather coarser, to 18 mm. long, and 8 mm. broad, and the culms solitary and smooth, or nearly so above, never distinctly rough.

In places covered with moss and lichens, at an altitude of about 2100 m. above sea-level, in the Altaian, I have collected some young specimens belonging to a form with culms only from 4 to 6 cm. high, and rather broad leaves, protruding considerably above the culms. The culms are, in the upper parts, sharply triangular and rough. The head consists of from 2 to 4 rather approximate, very loosely flowered and narrow, nearly cylindric spikes, from 8 to 14 mm. long, and only from 3 to 4 mm. broad, all of them very shortly stalked. The glumes are more acute than in the typical *atrata*, and considerably longer than the perigynia. In point of external habitus this form resembles much *Carex stylosa* C. A. MEYER, but differs distinctly, for one thing, in having the glumes more acute and narrow. Occurring together with *Carex rigida*, and may possibly have to be regarded as a bastard between *Carex atrata* and *Carex rigida*.

Distribution: *Carex atrata* occurs in the northern and alpine regions of Europe, southwards to the Pyrenees and the Balkan Peninsula, south-western Asia, Turkestan, Siberia, northern Mongolia, Manchooria, eastern Asia, North America, Greenland.

subspec. **aterrima** (Hoppe) Hartm. in Svensk och Norsk Excursions-Flora (1846) p. 331; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 398; Ledeb. Fl. Alt. IV, p. 215. *Carex atrata β* Ledeb. Fl. Ross. IV, p. 287; Turczan. Fl. Baical.-Dahur. l. c. p. 336; Kükenth. *Cyper.-Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 108.

This subspecies is characteristic in having the culm relaxed, rather rough, and in having the lowest bract large and foliaceous, equalling or exceeding the terminal spike. The specimens collected have 3 to 4 rather densely congested spikes on short, erect, not relaxed or drooping stalks. The leaves rather narrow, 3 to 4, rarely to 5 mm. broad, and are, consequently, narrower than usual. Intermediates between this one and the typical *Carex atrata* seemed to occur.

Distribution: Together with the main species.

Carex **tomentosa** L. Mant. I (1767) p. 123; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 434; Ledeb. Fl. Ross. IV, p. 303; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 115; Крыл. Фл. Алт. VI (1912) p. 1498.

In moist, grass-grown depressions on the Abakan Steppe, near Askys. Not very common. Taken past flowering and with fruits in the middle of June. The specimens collected are low, the height of the culms not exceeding 20 cm. The glumes are of a light brown colour, with a midrib of the same colour as the glume, rarely slightly lighter, never green.

Distribution: Europe, except the northern parts, Caucasia, western Siberia, eastwards to about the Yenisei.

Carex globularis L. Spec. Pl. ed. II (1763) p. 1385; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 437; Turczan. Cat. Baical. no. 1241; Ledeb. Fl. Ross. IV, p. 304; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 116; Turczan. Fl. Baical.-Dahur. (1855, II) p. 346, no. 1264; Крыл. Фл. Алт. VI (1912) p. 1499.

Pretty common in the Sayansk district, on moist, mossy ground in coniferous woods, among *Hypnum*, etc., in the subalpine woods about the Upper Amyl, the Upper Sisti-kem, and at Ust Algiac. In flower and partly past flowering in July.

Distribution: Northern and middle Europe, Siberia, northern Mongolia, eastern Asia, Sakhalin.

Carex supina Wahlenb. in Vet.-Akad. Handl. XXIV (1803) p. 158; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 455; Ledeb. Fl. Alt. IV, p. 218; Turczan. Cat. Baical. no. 1240; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 893; Ledeb. Fl. Ross. IV, p. 305; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 112; Turczan. Fl. Baical.-Dahur. (1855, II) p. 348, no. 1268; Крыл. Фл. Алт. VI (1912) p. 1503. *Carex mucronata* Trev. in Ledeb. Fl. Ross. IV, p. 308 ex parte.

Very common in dry, sandy meadows, on sandy steppes, etc., about the rivers Yenisei, Abakan, and Ulu-kem. Frequently accompanying *Carex stenophylla* and *Festuca ovina*. With nearly ripe fruits in the first half of June. The pistillate spike is sometimes reduced to a single flower: *f. pseudomonostachys* Aschers. in Verh. Bot. Ver. Brandenb. XL (1897). On the steppes near Ust Abakansk, I have collected a coarser form, with culms from 20 to 25 cm. high, not unfrequently with longer leaves, in which the pistillate spikes are rather large, to 8 mm. in diameter, and rather flowery, each with to 9 flowers.

Distribution: Middle and southern Europe, Caucasia and south-western Asia to the Himalayas, North America, Greenland.

Carex pediformis C. A. Meyer in Mem. Acad. St. Petersb. I (1831) p. 219; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 490; Ledeb. Fl. Alt. IV, p. 225; Ledeb. Fl. Ross. IV, p. 290; Turczan. Cat. Baical. no. 1244; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 135; Turczan. Fl. Baical.-Dahur. (1855, II) p. 339, no. 1252; Крыл. Фл. Алт. VI (1912) p. 1506. *Carex obliqua* Turczan. Cat. Baical. no. 1243.

Rather common in dry, sandy and stony places on the steppes along the rivers Yenisei and Abakan. With flowers and ripe fruits in the middle of June.

subspec. **rhizina** (Blytt) Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 491; Крыл. l. c. (1912) p. 1506.

Scattered together with the preceding one.

Distribution: Northern and eastern Europe, northern and eastern Asia.

Carex limosa L. Spec. Pl. ed. II (1763) p. 1386; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 504; Turczan. Cat. Baical. no. 1252; Ledeb. Fl. Ross.

IV, p. 307; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 142; Turczan. Fl. Baical.-Dahur. (1855, II) p. 343, no. 1258; Крыл. Фл. Алт. VI (1912) p. 1509, *forma.*

The specimens collected by me are not the true *Carex limosa,* but they are characteristic in having the bracts always very short and slender, 1 to 2 cm. long, not quite sheathing, but furnished at the base with narrower or broader auricles of a brown colour. The culms are sharply rough in the upper parts, and are of about the same height as the leaves, which are very narrow, only from 1 to 1,5 mm. broad. The spikes are 2 in number, the upper one staminate, the lower one pistillate, frequently very few-flowered, and not unfrequently sterile. The glumes of the pistillate flowers are narrower, and at times considerably longer than the perigynia, the dorsal nerve always produced into a mucro, always of a uniform reddish brown, and always wanting a green median stripe. The pistillate spikes frequently rather few-flowered and short, sometimes nearly globular. The style always much projecting.

Of very common occurrence in very humid *Sphagnum*-bogs, near Ust Algiac, on the right bank of the river Sisti-kem, where growing together with *Carex magellanica, Carex pauciflora, Andromeda polifolia, Ranunculus radicans,* and others. Past flowering, and partly with nearly ripe fruits at the end of July.

These specimens may partly, at any rate, have to be regarded as the bastard *Carex limosa* × *C. magellanica,* with which they seemed to agree perfectly, according to the diagnosis in KÜKENTHAL, *Cyper.-Caricoid.* l. c. (1909) p. 507.

Distribution: The species is distributed over Europe, except the extreme southern regions, Siberia, eastwards to the Amoor Province, Manchooria, Corea, Sakhalin, North America.

Carex magellanica Lam. Encycl. III (1789) p. 385; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 505; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 142. *Carex irrigua* Smith ex Hoppe, Caric. German. (1826) p. 72; Ledeb. Fl. Ross. IV, p. 307; Крыл. Фл. Алт. VI (1912) p. 1510.

Rather common in *Sphagnum*-bogs at Ust Algiac, together with the preceding one. Nearly past flowering and with nearly ripe fruits at the end of June.

Distribution: Northern and middle Europe, Siberia, northern Mongolia, northern and southern America.

Carex panicea L. Spec. Pl. ed. II (1763) p. 1387; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 510; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 145; Ledeb. Fl. Ross. IV, p. 291; Turczan. Fl. Baical.-Dahur. (1850, I) p. 341, no. 1255; Крыл. Фл. Алт. VI (1912) p. 1513.

In moist grass-fields on the river Abakan, near Askys, where collected by me in abundance, in full flower about the middle of June. I have also collected, beside the typical form, some specimens about the river Abakan, with pistillate spikes of a pale yellow, *f. pallida* BLYTT, Norges Flora (1861) p. 235, as well as forms with a loosely

flowered pistillate spike, starting directly from the base on a slender stalk, *f. rhizogyna*. Some of the specimens are distinctly intermediate to *Carex sparsiflora* (WAHLENB.) STEUD., and may possibly have to be regarded as bastards between these two species. Quite typical specimens of *Carex sparsiflora* do not, however, occur in my collections.

Distribution: The species is distributed nearly all over Europe, except the extreme south, western and northern Asia from Caucasia through Turkestan and Siberia to Baikal. Introduced into North America.

Carex displodens *nov. spec.* [Tab. IV, Fig. 2].

Culmus 25-40 cm. altus, tener, plus minus inclinatus, leviter angulatus, sulcatus. Folia dimidium longitudinis culmi, laxa, angustissima, 1-2,5 mm. lata—fere 1,5-2 mm. lata—plana, in acumen longum, paene filiforme producta, margine scabra, colore oleagineo, vaginis suffuscis. Spiculae vulgo 3, distantiores; terminalis mascula, 8-12 mm. longa, 2-3 mm. lata, laterales femineae, 10-15 mm. longae, 3-4 mm. latae, multiflorae et densiflorae, perlonge pedunculatae, pedunculis capillaribus, plus minus laxis, teretibus, glabris vel parce scabris. Bracteae foliaceae, longe vaginantes, contractae, laminis angustis, attenuatis, spiculam superantibus. Squamae floris femineae late ovatae, parvulae, plus minus 1-1,5 mm. longae, stramineo-virides, paene omnino hyalinae, apice rotundato vel late acuminato, 3 nerviae, media distincta, laterales minus conspicuae. Utriculi immaturi cum squamis aequilongi, maturi circa 1/3 longiores, late fusiformes, 1,5-2 mm. longi, triangulati, clare virides, fere membranacei, translucidi, glabri, enervii, in summis lateribus spiculis paucis, exiguis praediti, adversus basin in stipitem brevem, crassum attenuati, apice obtuso, integro, erostrato. Utriculi semper directi, nunquam obliqui. Nuce adolescente, utriculus disploditur. Nux late ovata, distincte trigona, lateribus concavis, inferne breviter stipitata, superne stylo breviore, subcylindriaco praedita. Stigmata 3, longitudinis mediocris.

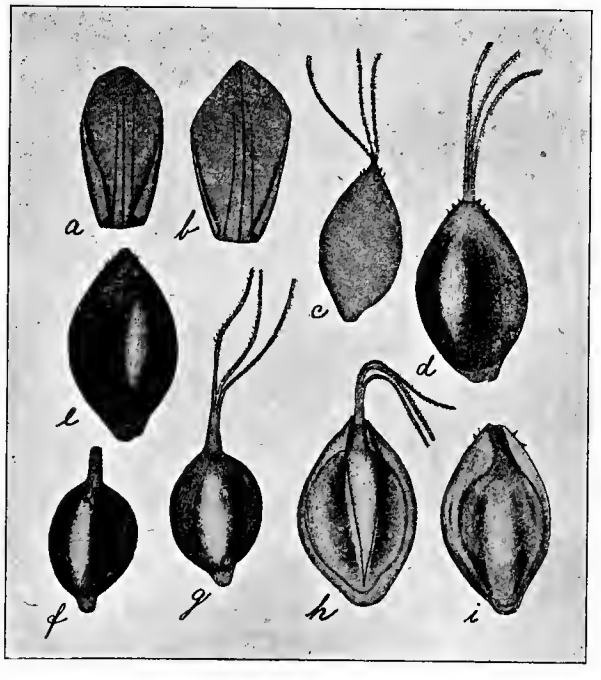

Fig. 77. *Carex displodens* nov. spec. (13/1). a and b. Glumes of pistillate flowers. — c. Young flower. d—g. Various stages of fruit formation; in h the perigynium has been burst by the nearly mature nut, in i the nut is visible through the nearly hyaline perigynium. — f and g. Nuts.

The species is especially distinguished by its slender, frequently slightly relaxed and recurved culms that are glabrous, nearly round, and slightly furrowed. The re-

laxed leaves are about half the length of the culm, of a peculiar olive green, at any rate when dried. The leaves are comparatively narrow, commonly about 1,5 to 2 mm. broad, and produced at the summit in a long and fine point, slightly rough along the margin. The number of the spikes is 3, of wich the upper one is wholly staminate, long-stalked, and densely flowered, about 1 cm. long, 2 to 3 mm. broad, with light yellowish brown glumes of a narrowly ovate to nearly lanceolate shape. The number of the pistillate spikes is 2, on long, erect, or more or less relaxed, cappillaceous, glabrous, or slightly rough peduncles. The pistillate spikes themselves are from 1 to 1,5 cm. long, and from 3 to 4 mm. broad, rather densely flowered. As a rule, the spikes are rather distant, but I have also collected specimens in which they are more approximate near the summit of the culm. In the plate (Tab. IV, Fig. 2) the spikes may possibly appear to be too loosely flowered, owing to the fact, however, that the ripe perigynia have fallen off. The bracts have long and narrow sheaths, with a rather long, but narrow lamina, overtopping the summit of the spike, but shorter than the culm. Each flower is characterized by its small dimensions. The glumes are from 1 to 1,5 mm. long, broadly ovate, rounded or slightly narrowed at the summit, of a light brown, nearly completely membranous, with one dorsal nerve, and 2 slightly shorter lateral nerves. The nerves are frequently slightly greenish, usually not reaching the apex of the glume.

The glumes are rather persistent, and remain on the spike after the ripe perigynia falling off. Thus, in dried specimens all of the glumes on the spikes may frequently be remaining, while the ripe perigynia have fallen off. At times it also happens that the nut itself, when having burst its perigynium, falls off, so that, here and there, open, empty perigynia may be found in the spikes. The perigynia are very small, 1,5 to towards 2 mm. long, with flowers about the length of the glume, later on somewhat prolonged, when ripe projecting about ⅓ beyond the glume. The shape of the perigynium is broadly fusiform, straight, never aslant, tapering upwards, and completely beakless at the summit, which is obtuse, tapering into a very broad and short stalk at the base, broadly egg-shaped and triquetrous from the distension of the ripening nut. The species is, for the rest, very characteristic in having the perigynia too narrow for the ripe nut, so as to burst its perigynia when ripening. When young the perigynia are fusiform, but are gradually distended by the growing nut, taking gradually its triquetrous shape. The perigynia are glabrous and nerveless, save for the summits, near which a couple of small and short prickles are to be found on each side, and the empty perigynium exhibiting 2 lateral, rather faint nerves, which are generally not visible as long as enclosing the nut. The perigynium is of a light green, nearly hyaline, frequently so as to make the nut shine through (Fig. 77, h—i). The nut is about 1 mm. long, broadly ovate, triquetrous, with concave sides, with a short stalk below, and a persistent, cylindrical style above. Stigmas 3, of medium length.

In this *Carex*, as in many others, there sometimes occur specimens with a very long-stalked pistillate spike starting from the root, *f. rhizogyna* (See Tab. IV, Fig. 2).

In external habitus, *Carex displodens* nov. spec. somewhat resembles *Carex capillaris*, but is, for the rest, in so far characterized by its minute, broadly fusiform, straight, completely beakless, narrow perigynia, being always burst by the ripe nut that it can hardly be confounded with any other species.

Collected on the Abakan Steppe, near Ust Kamuishto, especially in moist, loamy and saliferous soil, together with various halophilous plants, as *Glaux maritima* subspec. *pedunculata*, *Plantago maritima* subspec. *ciliata*, *Ranunculus plantaginifolius*, *Lepidium crassifolia*, *Primula longiscapa*, and others.

In flower and with ripe fruits in the second half of June.

Carex atro-fusca Schkuhr, Riedgr. I (1801) p. 106.

subspec. **coriophora** (Fischer) Kükenth. *Cyper.-Caricoid.* H. 38 (IV, 20, 1909) p. 554; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 150. *Carex ustulata* var. *β* Trev. in Ledeb. Fl. Ross. IV, p. 295. *Carex ustulata γ* C. A. Meyer in Ledeb. Fl. Alt. IV, p. 233. *Carex ustulata* var. Turczan. Cat. Baical. no. 1263. [Tab. II, Fig. 1].

This subspecies is especially characterized by its short and thick spikes, of a pallid yellowish brown colour. The culms are erect, from 30 to 40 cm. high. The leaves are flat, comparatively broad and short, to 6 mm. broad, of a greyish green colour, rough at the margin and along the nerves underneath, from ⅓ to ¼ of the length of the culms. The number of the spikes to 7, nearly ovoid, on capillaceous, relaxed stalks, from 1 to 2 cm. long. The upper spike is commonly wholly staminate, or, at times, with some few pistillate flowers at the summit. The pistillate spikes are comparatively short and obtuse, broadly obovate, to 1,5 cm. long. The glumes are ovate-lanceolate, subacute, 3 mm. long, 1 mm. broad, mostly broadest above the middle, not distinctly scarious-margined, of a shining yellowish brown colour, with a greenish midrib, reaching the summit of the glume. The perigynia are rather broadly oval, inflated, from 3,5 to 4 mm. long, and 2,5 mm. broad, longer and broader than the glume, nerveless, slightly trigonous below, compressed above, of a yellowish brown colour, with greenish margins, nearly hyaline, slightly rough along the margin in the upper part, furnished above with a short scarious-margined, truncate beak. The nut is long-stalked.

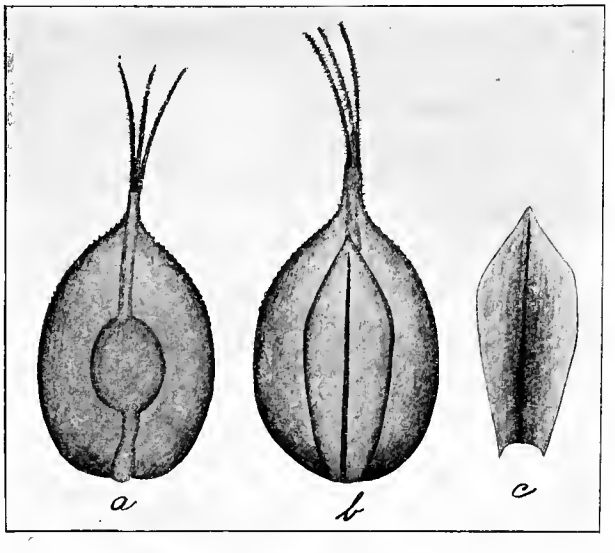

Fig. 78. *Carex atro-fusca* Schkuhr subspec. *coriophora* (Fischer) Kükenth. (11/1). a. Pistillate flower; the perigynium is rather transparent, and the long-stalked achene may be seen through. — b. Perigynium with the glume. — c. Glume.

Taken on the Abakan Steppe, near Askys, in moist grass-grown depressions, near the river, where associated with *Carex capillaris* subspec. *densiflora*, *Carex panicea*, *Orchis spec. div.*, *Cypripedilum macranthum*, *Carex tomentosa*, etc. In full flower and with young fruits in the middle of June.

Distribution: This subspecies is distributed over central Asia from Turkestan to Trans Baikal.

Carex fuliginosa Schkuhr, Riedgr. I (1801) p. 91; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 556; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 151.

This species is of very rare occurrence in Asia, where heretofore only indicated for Siberia by Lessing, on the Ssogutici mountain, in the government of Yenisei. From the Altaian I have brought home a rather rich material of it, taken in moist, grass-grown places, among stones and gravel, at altitudes of about 2000 m. above sea-level. Specimens collected here at the end of July, are nearly past flowering, and with nearly ripe fruits.

These specimens from central Asia do not agree perfectly with the European ones, as they appear, in some respects, to be intermediate to *Carex macrogyna* Turczan. (Bull. Soc. Nat. Moscou, 1838, p. 104), as well as to *Carex frigida* All. (Fl. Pedem. II, 1785, p. 270).

The culms are, by the way, higher and more vigorous than usual in the typical *Carex fuliginosa*, from 30 to 45 cm. high. The leaves are comparatively broad, from 4 to 6 mm. broad, about half as long as the culms. The sheaths of the bracts are always completely green, not brownish. Number of spikes as a rule 5, of which the 2, or rarely 3 upper ones are staminate and densely approximate at the summit of the culm, shortly pedunculate. They are rather long and narrow, from 1 to 2 cm. long, and 2 to 3 mm. broad. In this character the specimens resemble much *Carex macrogyna*, but differ distinctly from the latter in the structure of the pistillate spikes, being the typical one of *Carex fuliginosa*. The pistillate spikes occur in a number of from 2 to 3, and are from 1 to 2 cm. long, from 0,5 to 0,8 cm. broad, on long peduncles, more or less relaxed, drooping and glabrous.

At the apexes of the pistillate spikes there are sometimes some few staminate flowers. The glumes are ovate, subacute at the summit, of a dark chestnut colour, and furnished with a membranous margin, which may be broader or narrower. The perigynium is somewhat longer than the glumes, oval lanceolate, 5 to 6 mm. long, nerveless and glabrous, tapering upwards, and drawn out into a distinctly 2-cleft beak, more or less distinctly membranous at the orifice. In many specimens this hyaline orifice is altogether or nearly wanting, and as these specimens are destitute of a membranous margin in the glumes as well, such specimens may resemble considerably *Carex frigida*. The perigynia tapers downwards into a broad stalk. The margin of the beak is distinctly scabrous in the upper half.

Quite typical specimens of *Carex fuliginosa* do not occur in my collection!

Besides these specimens I have collected, in the Altaian, a number of specimens belonging to a smaller form, much resembling subspecies *misandra*, but differing from the latter in pretty essential characters.

This one is separated by me under the name of

subspec. **pronella** *nov. subspec.* [Tab. V, Fig. 2 and 3].

Paucitate spicularum ab forma typica differens; spiculae numero non plures quam 2 vel 3, pedunculis longis, tenuibus, pronis, teretibus, glabris insertae.

Spiculae terminali flores tantummodo masculi, spiculae inferiori, vel duobus spiculis inferioribus, semper feminei, pedunculis longis, tenuibus, laxis, pronis inserti. Spiculae omnes longae et angustae, 12-15 mm. longae, 2-4 mm. latae. Squamae comparate latae, marginibus late nembranaceis, nervo dorsali distincto instructae. Cetera subspeciei misandrae similis.

In point of external habitus, this subspecies resembles, at first sight, *Carex fuliginosa* subspec. *misandra* to such a degree that they may be confounded, but is definitely distinguished from the latter by having the spikes longer and very narrow, only 2 or 3 in number, unisexual, the upper one wholly staminate, the lower one wholly pistillate. The spikes are always more than 1 cm. in length, generally from 12 to 15 mm., and from 2 to 4 mm. broad, while in subspecies *misandra* the spikes are more numerous, shorter and broader, frequently nearly globular, never exceeding 1 cm. in length, the terminal spike androgynous, staminate at the base, and pistillate at the summit, and the other ones only having pistillate flowers. Besides, the glumes have a very broad membranous margin, being on both sides fully as broad as the dark central part of the glume, the whole of the spike thus becoming much paler and lighter. The glumes are also generally comparatively broader, and furnished with a very marked midvein. The perigynium is 5 mm. long, somewhat longer than the glumes, nerveless, glabrous, of the same shape as in the typical species. The leaves are short, from about ⅓ to ¼ of the length of the culm rigid, slightly channelled, and recurved-spreading. All of the spikes are long-stalked, and, like the upper parts of the whole culm, with the staminate spike overhanging and drooping. The culm is about 10 to 25 cm. high. This subspecies also somewhat resembles *Carex sempervirens* var. *pendulina* KÜKENTH. (in Bull. Herb. Boiss. 2. Ser. IV, 1904, p. 58) but differs from the latter, above all, by having the perigynia glabrous and nerveless, only rough along the margins, and only slightly projecting beyond the glumes, which are broader, broadly ovate, and more obtuse, and furnished with a very broad membranous margin.

This species and the allied ones, with their many varieties and forms, seem to be in great need of a more minutely systematic investigation.

Distribution: The main species is distributed in alpine and subalpine regions of central Europe, the Caucasus, Siberia (Montes Ssogutici, LESSING), northern Mongolia (the Altaian); subspec. *misandra* occurs in the arctic regions of northern Europe, the arctic islands, arctic Asia, on the tundras on the coasts of the Arctic Ocean, on the

rivers Olonek and Lena, the Tschuktscher Peninsula, the Arakam Island, as well as North America and Greenland.

Carex sempervirens Vill. Pl. Dauph. II (1787) p. 214.

subspec. **tristis** (Marsch.-Bieb.) Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 569. Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 154; Крым. Фл. Алт. VI (1912) p. 1515. *Carex tristis* Marsch.-Bieb. Fl. Taur. Cauc. III (1819) p. 615; C. A. Meyer in Ledeb. Fl. Alt. IV, p. 228; Bunge, Enum. Alt. p. 83; Turczan. Cat. Baical. no. 1256; Trev. in Ledeb. Fl. Ross. IV, p. 294; Turczan. Fl. Baical.-Dahur. (1855, II) p. 349, no. 1271. *Carex frigida* Regel in Act. Hort. Petropol. VII (1880) p. 569.

In the Altaian, in moist, grass-grown places, at an altitude of about 2000 m. above sea-level. Partly done flowering at the end of July.

Distribution: The subspecies occurs in the Caucasus, Asia Minor, south-western Asia, Dzungaria, the Altai and Sayansk regions, the Baikal region, Taimur, the Himalayas, Cashmere.

Carex capillaris L. Spec. Pl. ed. II (1763) p. 1386; Ledeb. Fl. Alt. IV, p. 227; Turczan. Cat. Baical. no. 1254; Ledeb. Fl. Ross. IV, p. 295; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 590; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 157; Крым. Фл. Алт. VI (1912) p. 1517.

subspec. **densiflora** *nov. subspec.*

Spiculis femineis praecipue notabilis, densifloris et multifloris, 20 fere flores singulis ferentibus, ideo quam spiculae formae typicae longioribus, numero fere 3–5.

Spicula terminalis mascula summam spiculam femineam fere paulo excedens. Utriculus in rostrum breve, crassum, conicum, nonnunquam obliquum, in duobus lateribus scabriusculum, contractus. Folia comparate longiora, plus minus 2–3 mm. lata.

This subspecies may somewhat resemble the Turkestan subspecies *Regeliana* in the several, very densely and flowery spikes, but is readily distinguished from the latter by the shape of the perigynia. In our plant the perigynium is ⅓ longer than the glume, ovoid, drawn out above into a rather short and broad, conical, generally slightly oblique beak, membranous and obtuse at the orifice, and bilaterally rough, while, in subspecies

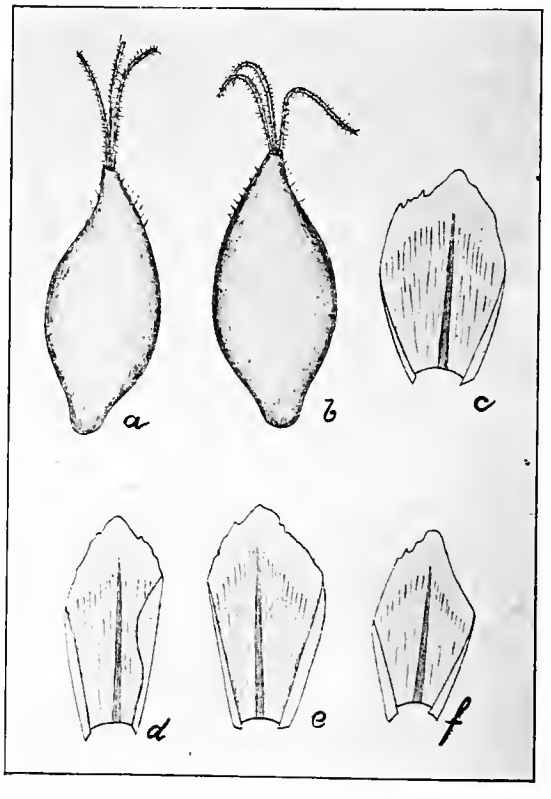

Fig. 79. *Carex capillaris* L. subspec. *densiflora* nov subspec. (11/1). a and b. Pistillate flowers — c—f. Glumes.

Regelliana the beak is very long. The number of the spikes is generally 4 to 6, of which the upper one is a rather small and few-flowered staminate spike, protruding nearly as high as the uppermost pistillate spike, or sometimes slightly higher. The number of the pistillate spikes is, by the way, from 3 to 5, very flowery and dense, containing about 20 flowers each. The pistillate spikes are oblong or cylindrical, from 12 to 15

Fig. 80. *Carex capillaris* L. subspec. *densiflora* nov. subspec. (1/1).

mm. long, and from 2 to 3 mm. broad. The perigynium is of a light green colour, with 3 rather short stigmas. The glumes are broadly ovate, the margin is membranous, of a pallid yellow colour, more or less distinctly subobtuse at the summit, and furnished with a distinct dorsal nerve, which is sometimes rough. The peduncles of the spikes are long, to 3 cm., capillaceous, during the flowering season, anyway, more or less erect. The bracts have long and narrow sheaths, the lower ones with large and well-grown laminas, reaching considerably above the spike itself, but are shorter than the culm, the upper ones more reduced, only small and setaceous. The culm is from 10 to 20 cm. high, and furnished with some few leaves. The leaves are comparatively long, about half the length of the culm, or longer, somewhat relaxed, from 2 to 3 mm. broad, pointed upwards, and slightly rough, of a fresh, light green, with brownish, sometimes fibrillose sheaths at the base.

Taken on the Abakan Steppe near Askys, in moist, grass-grown places, near the river. In flower in the middle of June.

Carex decipiens *nov. spec.* [Tab. IV, Fig. 1].

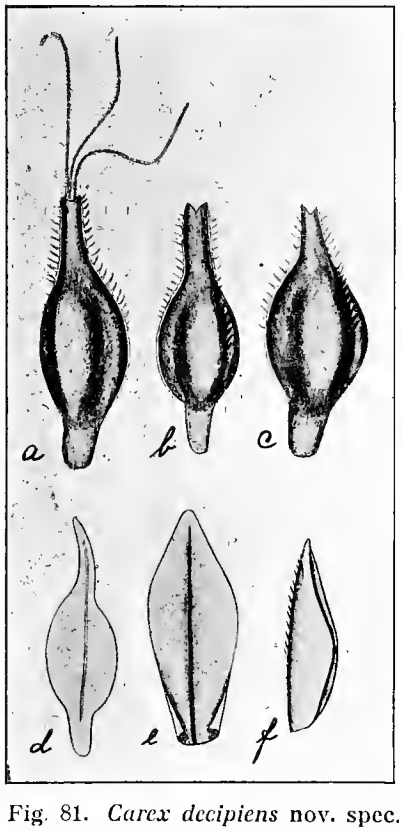

Fig. 81. *Carex decipiens* nov. spec. ($^{11}/_{1}$). a—c. Perigynia. — d. Side-view of a perigynium, with the lateral rib. — e and f. Glumes. f. Side-view.

Culmus ad basin vaginis fibratis obtectus, 20-25 cm. altus, tenuis, inferne rigidus, directus, superne laxus, glaber, sulcatus. Folia $^{1}/_{3}$-$^{1}/_{2}$ longitudinis culmi, 1-2 mm. lata, plana, leviter canaliculata, rigida, saepius incurvata, ad apicem attenuata et acuminata, margine, et nonnunquam secundum nervos lateris inferioris, leviter scabra. Spiculae 3 distantiores, longe pedunculatae; terminalis tantum mascula, 10-15 mm. longa, 2-4 mm. lata, densiflora et multiflora et spiculas femineas distincte superans, laterales tantum femineae, floribus paucis et sparsis, 10-15 mm. longae, pedunculis capillaceis, erectis, vel leviter laxis, teretibus, partim parce scabris, nunquam pubescentibus affixae. Vaginae bracteārum longiores, angustiores, inferior distincte laminifera, fere circiter medium spiculae attingens, superior tantum lamina brevi et reducta. Squamae floris femineae oblonge ovatae, versus apicem leviter attenuatae, rotundatae vel acuminatae, marginibus nembranaceis distinctis, carina distincta, fere scaberrima, instructae. Utriculi 2,5-3 mm. longi, squamas aequantes, ferme ovati, triangulati, apice abrupte contracti, et in rostrum subcylindriacum, nonnunquam paululum obliquum, ore hyalino, fere distincte bidentato, productum, basi in stipitem subcylindriacum abrupte attenuati. Utriculi pallide flavi, glabri, enervii, paululum compressi et duabus

marginibus lateralibus instructi in rostrum continuatis, in parte dimidia superiore dense aculeatis. Nux late ovata, 1,5-2 mm. longa, trigona, lateribus concavis, apice stylo cylindriaco instructa. Stigmata 3, longiora.

In point of external habitus this species resembles not a little *Carex capillaris*, especially so the subspecies *Ledebouriana* C. A. MEYER = *Carex lenaeensis* KÜKENTHAL, *Cariceae Cajanderianae* (1903) p. 10, with the description of which it agrees in many respects. *Carex fraudulans* nov. spec., however, is distinctly divergent in its considerably larger spikes, with the peduncles glabrous or slightly rough, never hairy. The bracts have rather long and narrow sheaths, the lower one with a lamina levelling the middle of the spike, the upper one only with a very small and much reduced lamina. The staminate spike is large, dense and flowery, long-stalked, frequently slightly drooping, distinctly much overtopping the upper pistillate spike. The glumes in the pistillate spikes are of the same length as the perigynia, about 3 mm. long, gradually tapering upwards, rounded or subacute at the summit, of a light yellowish brown, broadly scarious-margined, and furnished with a distinct dorsal nerve, which is frequently rough. They are persistent, not deciduous. In other respects, the species is characterized by having the perigynia of a light yellow, the beaks of which are very long, about equally narrow throughout their length, and — not as in *Carex capillaris* and its varieties, more or less conical — distinctly apart from the perigynium itself, the orifice of which is hyaline, more or less distinctly 2-cleft. The base suddenly narrowed into a rather long, cylindrical stalk. The perigynium is distinctly triquetrous, with concave sides, somewhat compressed, and furnished with 2 longitudinal lateral ribs, continued right out into the beak, and distinctly beset with rather long, dense, vigorous prickles, spreading, or more or less appressed. As for the rest, glabrous and nerveless.

The perigynia are of about the same length as the glumes, by which character this species is distinctly divergent from *Carex koreana* KOMAROW, which it resembles in the structure of the perigynium, but in the latter species the perigynia are twice as long as the glumes. The nut is about 1½ to 2 mm. long, broadly ovate, triquetrous, with concave sides, furnished above with a subcylindrical beak, truncate at the summit, and filling up the whole of the perigynium. The stigmas are 3, rather long.

There can be little doubt that this species systematically is rather nearly allied to *Carex capillaris* and must be reckoned in the same section, but differs from the latter in its long beak, distinctly apart from the perigynium, and equally broad throughout its length, 2-cleft at the summit, moreover in the two lateral ribs, beset with dense and long prickles, and in its narrowed, frequently subacute glumes, of the same length as the perigynium; moreover, in its long-stalked staminate spikes, much overtopping the upper pistillate spike. The stigmas are also considerably longer than in *Carex capillaris*.

Collected in the Altaian, at an altitude of about 2000 m. above sea-level, in somewhat moist, grass-grown places. In flower and with ripe fruits in the second half of July.

Carex Arnellii Christ apud Scheutz, Plant. Vascul. Jenis. p. 177 in Svensk Vet. Akad. Handl. N. F. XXII (1887); Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 609; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 159; Крыл. Фл. Алт. VI (1912) p. 1519. *Carex Turczaninowiana* Meinsh. *Cyperac.* d. Fl. Russl. p. 363. *Carex sylvatica β* Turczan. Fl. Baical.-Dahur. (1855, II) p. 344, no. 1260. *Carex sylvatica* Huds., Ledeb. Fl. Alt. IV, p. 230; Ledeb. Fl. Ross. IV, p. 295 ex parte. *Carex Drymeja* Turczan. Cat. Baical. no. 1249.

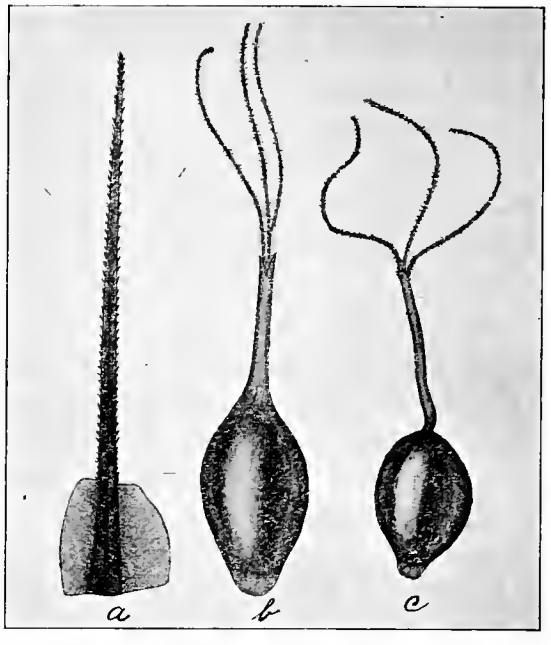

Fig. 82. *Carex Arnellii* Christ *f. longearistata* Komar. (8/1). a. Glume. — b. Pistillate flower with incipient fruit formation. — c. Nut.

The specimens collected are distinguished by having the pistillate spikes, especially the lower ones, very loosely flowered, f. *sparsa* Kükenth. l. c. (1912) p. 161. The distance between the lower flowers in the spike is to 1 cm. The terminal staminate spike is 2 to 2,5 cm. long, on slender, frequently slightly relaxed peduncles, 2 to 3 cm. long. The upper pistillate spikes now and then androgynous, with staminate flowers at the summit. The glumes of the pistillate spikes are very short, about 2 mm. long, broadly ovate, with a very long and produced, narrow midrib, to 9 or 10 mm. long, rough along the margin, f. *longearistata* Komarow, Фл. Маньчжурии I (1901) p. 378. The central part of the glume and the drawn out midrib are green, for the rest membranous. The perigynia on each side with a distinct lateral nerve, which is continued upwards in the beak. The perigynia, including the beak, are from 6 to 7 mm. long, and projecting far beyond the glume itself, which is only 2 mm. long, and 1,5 mm. broad. The leaves along the margin and on the midrib rather rough. The nut is triquetrous, with concave sides, from 2 to 2,5 mm. long, with a long, generally fragile style. The specimens taken in the first half of June are in flower, and partly past flowering.

Scattered in thickets of foliferous trees along the Yenisei, and in moist thickets on the islets, near Ust Abakansk.

Distribution: Northern and eastern Asia.

Carex diluta Marsch.-Bieb. Fl. Taur.-Cauc. II (1808) p. 388 et III (1819) p. 614; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 659; Turczan. Cat Baical. no. 1251; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 898; Ledeb. Fl. Ross. IV, p. 299; Meinsh. *Cyper.* Fl. Russl. (1901) p. 382; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл.

Сиб. II (1912) p. 171; Turczan. Fl. Baical.-Dahur. (1855, II) p. 344, no. 1261; Крыл. Фл. Алт. VI (1912) p. 1520.

In saliferous soil, near Ust Kamuishto, associated with various halophilous plants. In flower and with fruits at the end of June.

Together with the typical form I have collected some specimens differing especially in their long, narrow leaves, only about 1½ mm. broad, relaxed, of a deep green. The leaves are nearly as long as the culms. The number of the spikes commonly 3, short, and more loosely flowered. The perigynia when ripe, are of a dark brown colour, with very prominent nerves, and with a broad, deeply 2-cleft beak, with rather much divergent teeth. For the rest, agreeing with the typical form. According to the description in MEINSHAUSEN l. c. (1901) p. 381, this form resembles rather much var. *chorgosica* (MEINSHAUSEN spec.), which is recorded, however, to have considerably broader leaves and a greater number of spikes.

Distribution: South-eastern Europe, Caucasia, south-western and western Asia to Turkestan and Afghanistan, Cashmere, Siberia eastwards to Dahuria.

Carex Oederi Retz. Fl. Scand. Prodr. (1779) p. 179; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 673; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 173; Крыл. Фл. Алт. VI (1912) p. 1521. *Carex flava* L. *f. minor* Ledeb. Fl. Ross. IV, p. 300.

In moist meadows on the river Abakan, near Askys. Flowering in the middle of June.

Distribution: Europe, south-western Asia, Siberia, the Azores, Madeira, North America (introduced).

Carex pseudo-cyperus L. Spec. Pl. ed. II (1763) p. 1387; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 695; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 175; Ledeb. Fl. Ross. IV, p. 308; Крыл. Фл. Алт. VI (1912) p. 1523.

On the borders of a swamp, south of Minusinsk. Flowering and with partly ripe fruits at the beginning of July.

Distribution: Europe, except the extreme north, Caucasia, south-western Asia, southern Siberia, central Asia, Japan, North Africa, North America, Mexico, New Zealand.

Carex rostrata Stokes in With. Arrang. Brit. Pl. ed. II, 2 (1787) p. 1059; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 720; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 181. *Carex ampullacea* Good., Ledeb. Fl. Alt. IV, p. 219; Bunge, Enum. Alt. p. 82; Turczan. Cat. Baical. no. 1261; Ledeb. Fl. Ross. IV, p. 318; Turczan. Fl. Baical.-Dahur. (1855, II) p. 351, no. 1274; Крыл. Фл. Алт. VI (1912) p. 1524.

On the banks of the Sisti-kem, in still, muddy places. With fruits in the first half of August.

Distribution: Northern and middle Europe, Siberia, northern Mongolia, south-western and central Asia, Greenland.

Carex laevirostris Blytt et Fries in Bot. Notis. (1844) p. 24; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 724; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 182. *Carex rhynchophysa* C. A. Meyer, Ind. Sem. Hort. Petropol. IX Suppl. (1844) p. 9; Ledeb. Fl. Ross. IV, p. 318; Turczan. Fl. Baical.-Dahur. (1855, II) p. 350, no. 1273; Крыл. Фл. Алт. VI (1912) p. 1525.

Scattered in the subalpine regions along the Upper Amyl, above Kalna, and on the Upper Sisti-kem, near Ust Algiac. With flowers and young fruits in the middle of July.

Distribution: Northern Europe, Siberia, eastern Asia, Sakhalin, Japan.

Carex vesicaria L. Spec. Pl. ed. II (1763) p. 1388 (excl. var. β); Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 725; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 183; Ledeb. Fl. Alt. IV, p. 220; Turczan. Cat. Baical. no. 1260; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 894; Ledeb. Fl. Ross. IV, p. 317; Turczan. Fl. Baical.-Dahur. (1855, II) p. 350, no. 1272; Крыл. Фл. Алт. VI (1912) p. 1526.

This species appears, in the territory explored, to be rather polymorphous. In swamps, on banks of rivers, etc., very common in the district about Minusinsk, on the islets in the rivers Yenisei and Abakan, where flowering in June. In the Urjankai country rather frequent on river-banks.

Distribution: Europe, south-western Asia, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North Africa, North America, Greenland.

subspec. **alpigena** Fries, Mant. III (1842) p. 124; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 727; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 185; Крыл. l. c. (1912) p. 1527.

In swampy places on the banks of the river Abakan, near Askys. In full flower about the middle of June.

Distribution: Northern Europe, Siberia, Greenland.

f. brachystachys Lindeb. Bot. Notis. (1855) p. 12; Kükenth. *Cyper.-Caricoid.* l. c. p. 727.

Of this form there occurs only one specimen in my collection, taken in a swamp between Minusinsk and Ust Abakansk.

Distribution: Norway (the Dovrefjeld), Siberia.

Carex riparia Curt. Fl. Lond. IV (1783) p. 60; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 735; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 188; Ledeb. Fl. Alt. IV, p. 221; Ledeb. Fl. Ross. IV, p. 314; Крыл. Фл. Алт. VI (1912) p. 1529.

On the banks of the Yenisei, and in swamps on the islets in the river, near Ust Abakansk, rather common. Taken flowering at the beginning of June.

Distribution: Europe, western and northern Asia, North Africa.

Carex vesicaria L. × **Carex riparia** Curt., Simonkai, Enum. Fl. Transs. (1886) p. 556; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 759.

Together with the main species in a swamp on an islet in the Yenisei, near Ust Abakansk. The perigynia are sterile.

Distribution: Europe, Siberia.

Carex nutans Host, Gram. Austr. I (1801) p. 61; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 740; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 191; Ledeb. Fl. Alt. IV, p. 220; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 895; Ledeb. Fl. Ross. IV, p. 315; Крыл. Фл. Алт. VI (1912) p. 1530.

In dry grass-field at Minusinsk. With nearly ripe fruits at the beginning of July.

Distribution: Middle and southern Europe, south-western and central Asia, Siberia, Mongolia, eastern Asia.

Carex heterostachya Bunge, Enum. Pl. Chin. Bor. (1832) p. 69; Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 741; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 192; Крыл. Фл. Алт. VI (1912) p. 1531. *Carex soongorica* Karel. et Kiril. Enum. Pl. Soong. no. 868; Ledeb. Fl. Ross. IV, p. 316.

Scattered on islets in the river Abakan, near Askys. The specimens collected with nearly ripe fruits at the end of June. The specimens have rather broad leaves, from 4 to 6 mm. broad.

f. brevidens Krylow, Фл. Алт. VI (1912) p. 1532.

Of this one there occurs in my collection only one specimen, taken in a moist meadow on an islet in the river Abakan, near Askys. In full flower in the middle of June.

Distribution: The species occurs in Persia, Siberia, northern Mongolia, eastern Asia.

Carex orthostachys C. A. Meyer in Ledeb. Fl. Alt. IV, p. 231; Turczan. Cat. Baical. no. 1258; Ledeb. Fl. Ross. IV, p. 316 ex parte; Turczan. Fl. Baical.-Dahur. (1855, II) p. 348, no. 1270; Крыл. Фл. Алт. VI (1912) p. 1533. *Carex aristata* R. Br. in Richardson, Franklin. Narr. Journ. Bot. App. (1823) p. 36 subspecies *orthostachys* C. A. Meyer, Kükenth. *Cyper.-Caricoid.* in Engl. Pflanzenr. H. 38 (IV, 20, 1909) p. 751; Kükenth. *Cyper. Sibir.* in Федченко, Мат. Фл. Сиб. II (1912) p. 195.

Pretty common in swampy meadows, and in thickets on the islets, and along the banks of the river Abakan, here and there accompanying *Carex caespitosa*. Taken flowering in the second half of June. The leaves are pubescent beneath and on the sheaths, and the specimens collected accordingly belong to *f. typica* Krylow l. c. (1912) p. 1334.

Distribution: Northern and eastern Asia.

Cobresia spec. (ad *filifoliam?)* [Tab. I, Fig. 1].

In moist, grass-grown places on the Abakan Steppe, near the river, at Askys, only about 300 m. above sea-level, I have collected some specimens of a *Cobresia* which I have not been able to identify with absolute certainty. It is especially characterized by having always 2 stigmas only. All of its hundreds of flowers examined by me, were

found, with no exception whatever, to have only 2 stigmas each. Of the 29 species of *Cobresia* described heretofore, there is known only one distigmatic species, viz. *Cobresia macrantha* BOECK, from western Tibet, from which, however, our plant is distinctly divergent in its structure in other respects, as in its much higher and more slender culms, narrower leaves, and in the structure of the spikelets themselves, and the appearance of the nut, so as to preclude the possibility of a mistake of identity. In *Cobresia filifolia* TURCZAN. = *Cobresia capillifolia* (DECNE) C. B. CLARKE var. *filifolia* (TURCZAN.) KÜKENTH., the number of the stigmas is reported to vary between 3 and 2. To judge from the various descriptions and the comparatively numerous mistakes, this variety seemed to be rather varying, and there is, accordingly, a possibility that my specimens might have to be referred to this one, perhaps as a special variety, having constantly 2 stigmas only. Nor is it quite precluded that there are concealed several distinct species under the name of *Cobresia filifolia*. This is the more probable because the home and centre of the genus *Cobresia* is central Asia, where occurring endemically in regions as yet comparatively little explored in point of botany. I think it expedient to give the following description of the specimens in question:

Rhizoma breve, repens. Culmi dense caespitosi, ad basim saepius bulbose tumescentes, vaginis brevibus, cinnamomeis, tenuiter fibratis, dense vestiti, 20-40 vel saepissime 30-35 cm. alti, graciles, sed rigidi et erecti, sulcati, triquetri, basi laeves, superne scabriusculi et similiter ac folia pallide virides aut cano-virides. Folia filiformia, 0,5 mm. lata, canaliculata, in sectione transversa paene triquetra, longitudine saepius duas partes culmi, rarius prope totius culmi longitudinem aequantia, longe attenuata, in marginibus et praecipue in partibus superioribus scabriuscula. Inflorescentia spicata, in circuitu oblongo-elliptica, 10-20 mm. longa, 4-7 mm. lata, suffusca. Spiculae propriae 6-8, lineares, subdensiflorae, e vario numero spicularum partialium compositae. Spiculae propriae inferiores maximae, bracteis squamiformibus suffultae, 6-10 spiculas partiales ferentes, superiores approximatae, ebracteatae, sensim breviores, paucioribus spiculis partialibus instructae, summae singulas tantummodo partiales spiculas continentes. Bracteae inferiores magnae, luxuriantes, ad basim culmum prope complectentes, paene rectangulatae, superne recte abscissae vel leviter emarginatae, et carina dorsi scabri instructa, in mucronem breviorem longiorem, ad 10 mm. longum, producta. Bracteae superiores minores. Spicula partialis ex uno fere flore femineo basilari et 3 floribus masculis superioribus composita; numerus florum masculorum inter 1 et 5 varians. Squamae pallide fuscae, 3,5-4 mm. longae, oblonge ovatae, attenuatae, subacutae, nervo dorsali scabro, sub apicem evanescente, instructae. Prophyllum floris feminei 3-4 mm. longum, 1,5 mm. latum, fuscum, membranaceum, oblongum, superne fere recte abscissum, enervium, in marginibus basi leviter connatum. Prophyllum floris masculi membranaceum, circa 3 mm. longum, angustum, scaphiforme, superne attenuatum, carina distincta, acuta, saepius scabriola instructum. Nux obovata, circa 3 mm. longa, compressa, pallide flava, inferne stipite brevi, crasso instructa, superne in rostrum rectum, conicum vel subcylindriacum productum, marginibus summis nonnunquam aculeis gracilibus instructa. Stigmata semper 2, 4-6 mm. longa.

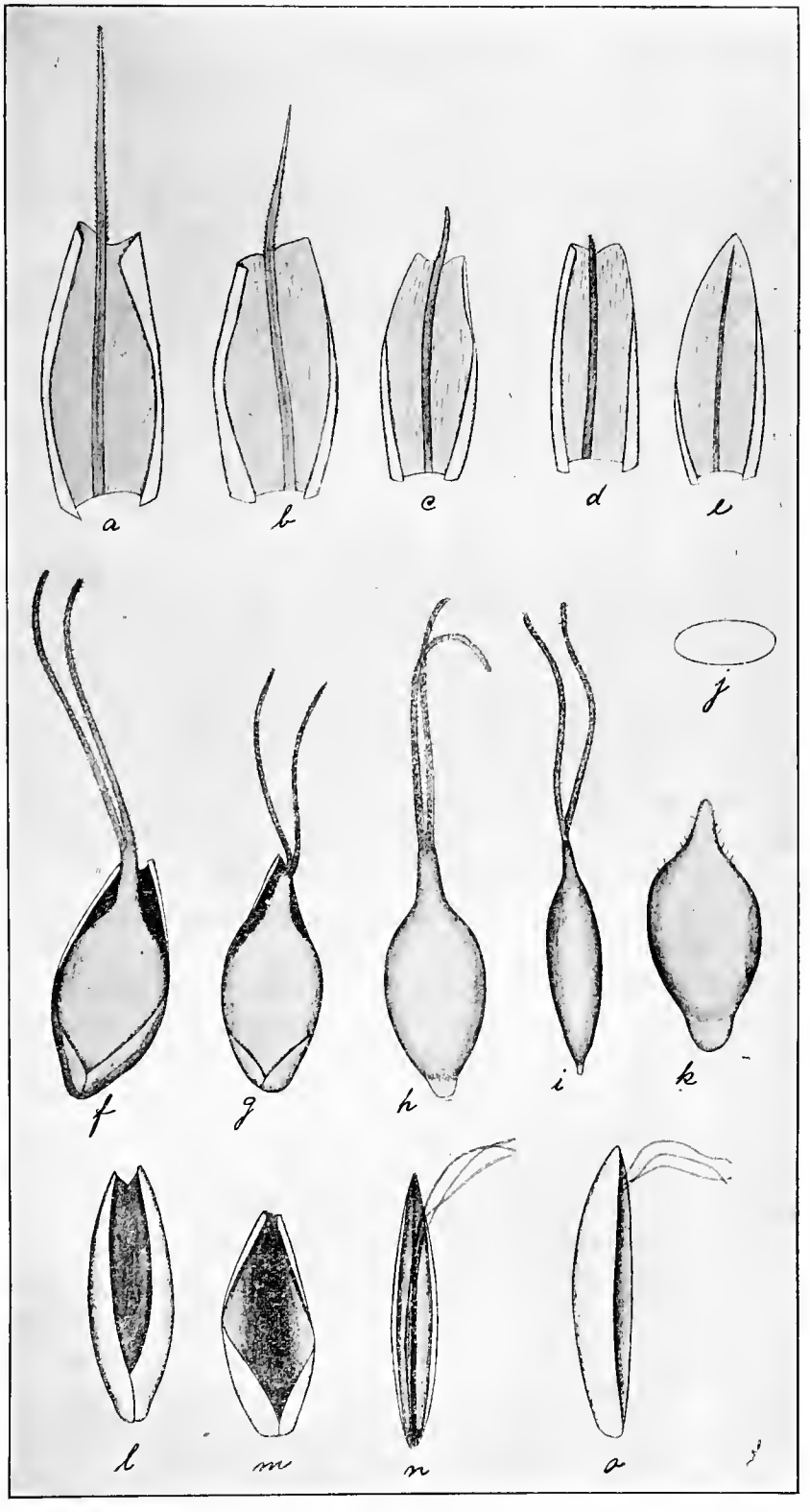

Fig. 83. *Cobresia* spec. (11/1). a—d. Bracts. — e. Scale. — f and g. Pistillate flowers with prophyls, seen from the interior side. — h, i and k. Achenes, i from the side. — j. Transversal section of achene. — l and m. Empty prophyls of pistillate flowers. — n and o. Prophyls of staminate flowers, n as seen from the interior side, o from the side.

In the structure of the vegetative shoot, this species is characterized by its long, very fine and slender, but rigid and erect culms, slightly rough at the summit, to 40 cm. high. The leaves are very narrow, filiform, only 0,5 mm. broad, infolded, or, in transverse section, nearly triangular, from one half of the height of the culms to towards equalling them. The flower cluster is from 10 to 20 mm. long, and from 4 to 7 mm. broad, and is made up of a varying number of spikes (spiculae propriae), densely congested, and appressed to the rachis, so as to look like one terminal spike at first sight. In this structure of the flower cluster it resembles *Cobresia caricina*, and has — like the latter — to be referred to the sect. *Eucobresia*, while *Cobresia filifolia*, according to the structure of the flower cluster, is referred to the sect. *Elyna*.

The lower spikes are the largest ones, to 13 mm. long, each containing to 10 spikelets (spiculae partiales). The spikelets are androgynous, each formed from one pistillate flower below, and a varying number, from 1 to 5, generally 3, of staminate flowers above. In the spikelet is sometimes to be found, besides a fully developed pistillate flower, also another one that is more or less reduced. Towards the summits of the spikes the pistillate flower is frequently reduced, so that the upper spikelets in the spike are formed from staminate flowers only. The upper spikes are smaller than the lower ones, and contain a smaller number of spikelets, and the uppermost ones are reduced to only containing one spikelet each. These spikelets are, accordingly, — at any rate the lower ones — enclosed by 2 glumes, of which the lower one must be considered as the bract, having also its more or less rectangular shape, and the upper one as the glume. The outmost one, viz. the bract, is gradually reduced upwards, so that the upper spikes are supported only by one glume, whereby the upper part of the flower cluster may really be regarded as a single terminal spike.

In less vigorous specimens the flower cluster is at times found to be formed only from one terminal linear spike, with a varying number of spikelets of the common androgynous structure, the lower spikes here also being reduced to a single spikelet. The bracts as well as the empty glumes of the spikelets are rather uniform. The lower ones are large and rather well developed, brown, scarious-margined, nearly square cut above, and furnished with a distinct midrib, frequently drawn out into a shorter or longer, to 10 mm. long, slightly rough awn. The upper bracts are smaller, and generally destitute of a protruding midrib, frequently more or less tapering upwards, but are easily identified by the midrib. The glumes are from 3½ to 4 mm. long, of a slight yellowish brown, narrowly ovate, tapering upwards, and pointed, and furnished with a midrib. The prophyllums of the pistillate flowers are fine, nearly membranous, of a light yellowish brown, nerveless, from 3 to 4 mm. long, and 1½ mm. broad, tapering upwards, only slightly united at the base. The nut is oval or obovate, about 3 mm. long, with a very short and broad stalk below, tapering and drawn out into a rather long, conical or subcylindrical beak above, compressed, elliptic or slightly trigonous in transverse section. The nut is of a pale yellow colour, smooth, or rarely furnished with a number of fine prickles along the margin in its upper half. The number of

the stigmas is always 2, rather long. The prophyllums of the staminate flowers are narrow, clapped in a boat's shape, pointed above, from 3 to 4 mm. long, generally furnished with a more or less distinct keel. The structure of the flower cluster is also, besides the 2 stigmas, one of the chief characters of this species. The flower cluster is generally of the same type as in the widely distributed *Cobresia caricina*, branched, and, accordingly, belonging to sect. *Eucobresia*. But owing to the fact that the upper spikes (spiculae propriae) are so much reduced, only containing one spikelet each, the flower cluster is at the summit really made up of a single terminal spike of the *Elyna* type. Add to this that in not quite well developed specimens the lower branches of the spike are also, at times, reduced to consisting only of one spikelet each, whereby the whole flower cluster is really formed from one terminal, linear spike, quite like *Elyna*. From this appears that the characters upon which the difference between the genera of *Cobresia* and *Elyna* are based, are of a very dubious systematic value, and, when combined in this way, not only in the very same species, but even in the very same individual, they will be seen to be so insignificant that it is hardly possible to separate these 2 genera only upon this character. KÜKENTHAL has, accordingly (1909), withdrawn the genus of *Elyna* as a section of *Cobresia* comprising the species having one linear terminal spike.

Scirpus paluster L. Spec. Pl. ed. II (1762) p. 70. *Eleocharis palustris* R. Br. Prodr. Fl. N. Holl. (ed. Nees) I (1810) p. 80; Ledeb. Fl. Alt. I, p. 69; Turczan. Cat. Baical. no. 1190; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 883; Ledeb. Fl. Ross. IV, p. 244; Turczan. Fl. Baical.-Dahur. (1855, II) p. 311, no. 1204. *Heleocharis palustris* R. Br., Крыл. Фл. Алт. VI (1912) p. 1422.

Rather common in moist, grass-grown, and irrigated places on the islets in the rivers Yenisei and Abakan, as well as in moist or irrigated depressions on the Abakan Steppe, near the river. Taken flowering in June. Specimens taken in different localities vary considerably in the length and thickness of the culms. Near Askys I have gathered a form with very slender and finely striped culms, about 40 cm. high. Hereby it recalls *f. filiculmis* (SCHUR.) ASCHERS. et GRAEBN., but differs from the latter in its large spikes, to 10 mm. long. In drier places the spikes become smaller, rounder, and few-flowered.

Distribution: Over the greater part of the globe.

Scirpus uniglumis Link, Jahrb. d. Gew. I, 3 (1818) p. 77. *Eleocharis uniglumis* Schult. Mant. in Syst. Veget. II (1828) p. 88; Ledeb. Fl. Ross. IV, p. 245. *Heleocharis palustris* R. Br. *β uniglumis* Schult., Крыл. Фл. Алт. VI (1912) p. 1422. *Eleocharis affinis* C. A. Meyer, Beitr. Pflanzenk. Russ. Reich. VIII (1851) p. 261.

In irrigated places near the river Abakan, at Uibat. In full flower at the end of June.

Distribution: The greater part of Europe, south-western Asia, Siberia.

Scirpus acicularis L. Spec. Pl. ed. II (1762) p. 71. *Eleocharis acicularis* R. Br. Prodr. Fl. N. Holl. (ed. Nees) I (1810) p. 80; Ledeb. Fl. Alt. I, p. 69; Turczan. Cat. Baical. no. 1192; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 884; Ledeb. Fl. Ross. IV, p. 243; Turczan. Fl. Baical.-Dahur. (1855, II) p. 311, no. 1203. *Heleocharis acicularis* R. Br., Крыл. Фл. Алт. VI (1912) p. 1421.

In swampy, irrigated places, rather common on the islets in the river Abakan, and on the banks of the river, in still places. Taken with young flowers in the second half of June.

Distribution: Europe, except the extreme southern and northern portions, south-western Asia, Siberia, eastern Asia, the East Indies, America, New Holland.

Scirpus silvaticus L. Spec. Pl. ed. II (1762) p. 75; Ledeb. Fl. Alt. I, p. 67; Turczan. Cat. Baical. no. 1196; Ledeb. Fl. Ross. IV, p. 250; Turczan. Fl. Baical.-Dahur. (1855, II) p. 314, no. 1210.

f. typicus Krylow, Фл. Алт. VI (1912) p. 1425.

Common in moist thickets, on the borders of small lakes, etc., on the islets in the Yenisei, between Minusinsk and Ust Abakansk. Specimens taken at the beginning of June bearing only young flower-buds.

f. Maximowiczi Regel, Tentam. Fl. Ussuriensis (1861) no. 541.

Specimens referred to this form by me, have been collected on the banks of the Bei-kem, near Ust Sisti-kem. The form differs from the preceding one in having the spikelets more pointed at the summit, and longer, from 4 to 5 mm. long, generally placed singly, or in pairs. Nearly past flowering at the beginning of August.

Distribution: Europe, except the arctic and extreme southern portions, south-western Asia, Siberia, northern Mongolia, eastern Asia, North America.

Scirpus maritimus L. Spec. Pl. ed. II (1762) p. 74; Ledeb. Fl. Alt. I, p. 68; Turczan. Cat. Baical. no. 1195; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 882; Ledeb. Fl. Ross. IV, p. 249; Turczan. Fl. Baical.-Dahur. (1855, II) p. 314, no. 1209; Крыл. Фл. Алт. VI (1912). p. 1426.

f. compactus G. F. W. Meyer, Chloris Hanoverana (1836) p. 603; Ledeb. Fl. Ross. IV, p. 249; Крыл. l. c.

Of very common occurrence on the borders of the saliferous marshes on the Abakan Steppe, where taken flowering by me in the middle of June. The head consists of from 2 to 5 spikelets, most commonly 3, rarely 2, or, at times, even of 1 spikelet (f. *monostachyus* G. F. W. Meyer, l. c.). The spikelets are to 1,8 cm. long, commonly from 1,2 to 1,5 cm. The glumes are always distinctly, densely and shortly pubescent, and with a far projecting dorsal nerve, of a rather light yellowish or green colour. The number of the stigmas always 2. The specimens collected are all comparatively slender, with culms from 30 to 50 cm. high, and with rather narrow leaves, to 3 mm. broad.

Distribution: Nearly all over the globe, except the extreme northern regions.

Scirpus Tabernaemontani Gmel. Fl. Badensis I (1805) p. 101; Ledeb. Fl. Alt. I, p. 66; Turczan. Cat. Baical. no. 1194; Ledeb. Fl. Ross. IV, p. 248; Turczan. Fl. Baical.-Dahur. (1855, II) p. 313, no. 1207. *Scirpus lacustris* L. var. *Tabernaemontani* (Gmel.) Döll, Rhein. Fl. (1843) p. 165; Крыл. Фл. Алт. VI (1912) p. 1426.

Common on the borders of swamps, etc., on the Abakan Steppe. In full flower in June. In the Urjankai country, in swamps on the Dora Steppe, near the Bei-kem.

Distribution: The greater part of Europe, south-western Asia, Siberia, northern Mongolia, the Himalayas, eastern Asia, North America, Africa, Australia.

Scirpus rufus (Huds.) Schrad. Fl. Germ. I (1806) p. 133; Крыл. Фл. Алт. VI (1912) p. 1429. *Blysmus rufus* Link, Hort. Berol. I (1827) p. 278; Ledeb. Fl. Ross. IV, p. 261; Turczan. Fl. Baical.-Dahur. (1855, II) p. 320, no. 1219. *Schoenus rufus* Huds. Fl. Angl. (1762) p. 15; Ledeb. Fl. Alt. I, p. 63; Turczan. Cat. Baical. no. 1188.

subspec. **exilis** *nov. subspec.* [Tab. I, Fig. 2].

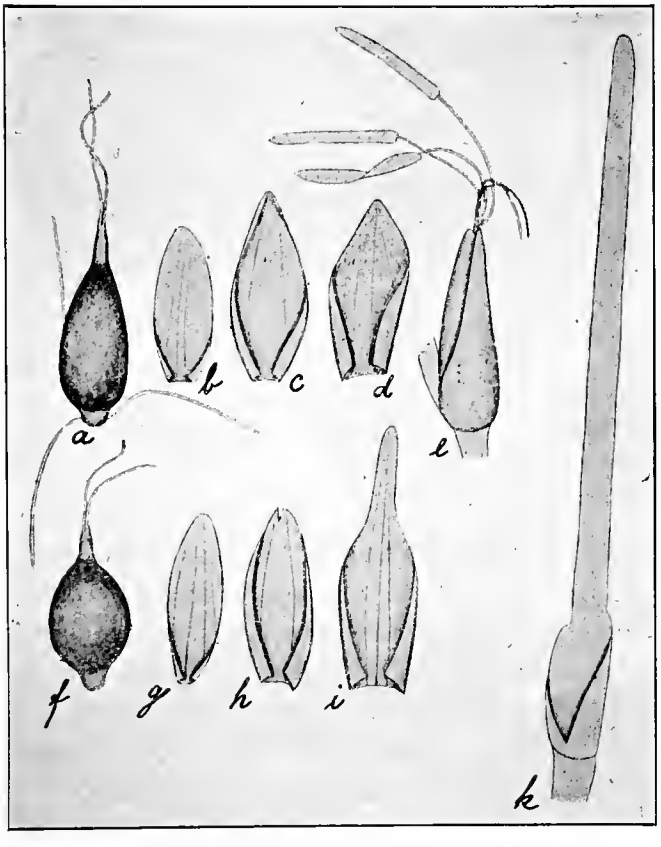

Fig. 84. *Scirpus rufus* (Huds.) Schrad. subspec. *exilis* nov. subspec. (8/1). a and f. Achenes. — b, c, g, h. Glumes. d, i, k. Different forms of bracts. — e. Spikelet.

Praecipue ab forma typica differt spiculis minoribus, 2,5-3 mm. longis, singulos fere flores ferentibus.

Rhizoma longum, repens. Culmi numerosi, 15-25 cm. vel rarius ad 40 cm., alti graciles, subteretes, superne tantummodo leviter trigoni, 0,5-1 mm. in diam., sicci utique leviter sulcati, ad basim vaginis fuscis, obtusis vestiti. Folia rigida, erecta culmo dimidio fere breviora sive aliquantulo longiora, satis crassa, superne leviter canaliculata, angusta, 0,5-1 mm. lata, apice plus minus obtusa, glabra sive apicem versus marginibus leviter scabris, colore, ut culmus, pallide galbino. Inflorescentia 0,5-1,5 cm. longa. Spiculae fuscae, oblonge ovatae, parvulae, 2,5-3 mm. longae. Numerus spicularum inter 1 et 5 varians, saepius 2-4, rarius 5. Spiculae flores singulos interdum etiam rudimentum floris superioris gerentes,; rarissime duo flores in una atque eadem spicula. Bracteae infimae saepius parvulae, squamiformes; rarissime reliquis longiores et brevis-

simo foliolo terminantes, apicem inflorescentiae contingente. Squamae 2,5-3 mm. longae, castaneae, 3-5 nerviae, late ovatae, apice plus minus rotundatae, nunquam mucronatae. Semen squamam aequans, ellipsoideum, compressiusculum, non trigonum, flavum, glabrum, in rostrum subcylindriacum productum. Setis nullis.

This subspecies differs, above all, from the typical species in its very small, one-flowered spikelets, few in number, whereby it also becomes very characteristic in point of external habitus. Sometimes there is to be found in the spikelets, besides the single, perfect flower, also a more or less rudimentary second one. 2 perfect flowers in one spikelet occur only very rarely. The spikelets are sessile; with ripe nuts they are ovoid, when flowering more oblong, from 3—4 mm. long, and are to be found in the spike in a number varying between 1 and 5, the most common number being 2 to 4. The length of the spike is 0,5 to 1,5 cm., and the breadth ½ to ¼ of the length. The glumes are broadly ovate, of a shining chestnut colour, like the bracts, 3—5-nerved, more or less subobtuse at the top, never acuminate or aristate. The lower bracts are generally nearly ovate, rarely prolonged, sometimes exceeding the spike. The nut is of the same length as the glumes, elliptic, compressed, not triquetrous, as in the typical form, yellowish, glabrous, lustreless when dried. It terminates above in a short, persistent style, about 0,5 mm. long, equally broad, of a darker colour. This style seemed, accordingly, to be comparatively shorter than in the main form. The nut itself is from 3 to 4 mm. long, including the style. The stigmas 2, of the same length as in the typical species. The plant in question also differs distinctly from the typical form in the external habitus of the vegetative shoot. Thus, the culms are much finer and more slender, usually only 0,5, rarely coarser, towards 1 mm. in diameter. When dried the culms appear to be slightly furrowed, round and slightly triangular above. Below, the culms are surrounded by brownish, obtuse sheaths and some leaves, about half as long as the culm, or slightly longer. The leaves are rigid, erect, of about the same breadth as the culm, chanelled above, the under side rounded and keelless. The apexes of the leaves are more or less obtusely rounded, where frequently of a slightly yellowish brown colour. The margin is glabrous, near the summit sometimes slightly rough. The whole plant is characteristic in having a pale, yellowish green colour. Bristles seemed always to be wanting.

Taken flowering and past flowering in the second half of June at Ust Kamuishto, where occuring on the borders of salt marshes and in saliferous soil. It is probably more widely distributed in Asia, but is supposed to have been confounded with the typical form. The ordinary *Scirpus rufus* does not occur in the material collected by me.

Scirpus caespitosus L. Spec. Pl. ed. II (1762) p. 71; Ledeb. Fl. Ross. IV, p. 246; Крыл. Фл. Алт. VI (1912) p. 1432.

The specimens collected are densely cespitose, with culms from 12 to 16 cm. high, rather vigorous, curved, glabrous and round, of a bluish green, surrounded at the base by yellowish grey sheaths, not distinctly shining. The upper sheaths obliquely cut,

only slightly emarginate, narrowly scarious-margined above, slightly inflated at the summit, and furnished with a subulate incipient leaf, about 3 mm. long. The spike is generally 5-flowered, the lowest glume commonly 5-nerved, and the elongated leaf-like process most frequently of a green colour. As to the anatomical structure of the culm, to which PALLA has attached some systematic importance, may be noted that the intervals between the vascular bundles are completely filled up with green cellular tissue, the cells of which have quite the same form, thickness of the walls, and diameter as usual; aircourses are here altogether wanting. The specimens collected thus seemed to agree best with f. *austriacus* (PALLA) ASCHERS. et GRAEBN. Synops. Mitteleur. Fl. II (1913) p. 300. As the plants are so young, I have not been able to express an opinion on the structure of the bristles.

The species is of rather common occurrence in the Altaian, above the tree limit, in swampy fields, where collected by me, with young flowers, at the end of July.

Distribution: The species is distributed over the greater part of Europe, Siberia, northern Mongolia, Sakhalin, Japan, North America, Greenland.

Scirpus alpinus Schleich. in Gaud. Fl. Helvetica I (1828) p. 108.

subspec. **oliganthus** (C. A. Meyer). *Isolepis oligantha* C. A. Meyer, Cyper. Nov. no. 3 in Mem. Pres. Acad. St. Petersb. I; Turczan. Cat. Baical. no. 1198; Ledeb. Fl. Ross. IV, p. 255; Крыл. Фл. Алт. VI (1912) p. 1433. *Isolepis elongantha* C. A. Meyer, Ledeb. Fl. Alt. I, p. 64. *Scirpus Meyeri* Trautv. Pl. Sib. Bor. sub no. 368. *Isolepis pumila* Roem. et Schult. Syst. Veget. II (1817) p. 106; Turczan. Fl. Baical.-Dahur. (1855, II) p. 316, no. 1212.

This form, which I refer here, is especially distinguished by its slender, filiform culms and leaves, and small, ovoid spikes. The rootstock is creeping. The culms are densely cespitose, generally about 20 cm. high, surrounded at the base by brown, lustreless, rather narrow sheaths, obtusely cut above. The upper sheath, or the two upper ones, are of a green or pale green colour, slightly membranous, with an erect, setaceous leaf, from 10 to 25 mm. long, with obtuse, frequently somewhat yellowish summits. The culms are of a fresh green colour, erect, rigid, but very fine and slender, scarcely exceeding 0,5 mm. in diameter, furrowed, round and glabrous, or only near the summit sometimes slightly triangular. The spike is terminal, very small, most frequently 3-flowered, rarely 2-flowered, ovoid or broadly ovoid, from 2 to 3 mm. long, and of a light yellowish brown colour. The glumes are broadly ovate, obtuse above, scarious-margined, frequently with a greenish dorsal nerve. The two lower glumes are generally destitute of flowers, and with a base more or less surrounding the spike, commonly not larger than the upper scales, apparently even smaller, and reaching only half up the spike. Sometimes the dorsal nerve of the lower glume is prolonged into a short, thick foliaceous tip, of a yellowish colour, thickened and obtusely rounded at the summit, whereby recalling much the lower glumes in *Scirpus caespitosus*.

This tip, however, is always very short, scarcely over 1 mm. long, and generally reaching only to half the height of the spike, never to the summit of the spike or exceed-

ing it, as may be the case in *Scirpus caespitosus* The nuts are small, from 1,5 to 2 mm. long, obovoid, and at the top slightly drawn out into a very low, broad, cylindric, persistent style, rounded at the summit. Their inner sides are plain or slightly concave, the outer sides slightly keeled. The style has an inarticulate base and 3 long stigmas, about twice as long as the style. Perigonial bristles are altogether wanting. This Siberian form is distinctly divergent from the European forms by its rather long and straight culms, very densely tufted, while the European ones have a long, trailing, much branched rootstock, with scattered, shorter and frequently somewhat ascending culms. Compared with the figure of this typical species in REICHENBACH, Icones Flor. Germ. 8, Tab. CCC, Fig. 709, the nut also appears to be less distinctly triquetrous; as a rule, the inner side is nearly plain or slightly concave, and it is also destitute of the fine, sharp point, so conspicuous in the figure of the European form. The style in the Siberian form is also considerably shorter. Moreover, the rootstock is less branched.

Of rather common occurrence in moist grass-field at Askys, near the river Abakan, where observed in flower and with ripe fruits in the middle of June.

Distribution: Europe, Siberia, south-western and central Asia, north-western Mongolia, North America.

Eriophorum vaginatum L. Spec. Pl. ed. II (1762) p. 76; Turczan. Cat. Baical. no. 1200; Ledeb. Fl. Ross. IV, p. 252; Turczan. Fl. Baical.-Dahur. (1855, II) p. 317, no. 1213; Meinshaus. *Cyperac.* Russl. (1901) p. 269; Крыл. Фл. Алт. VI (1912) p. 1436.

Scattered in subalpine peat-bogs in the Amyl taiga, near Kushabar, and in the Urjankai country near Ust Algiac, where I have taken it with fruits at the end of July.

The specimens collected probably belong to var. *brachyantherum* (TRAUTV.) *(Eriophorum brachyantherum* TRAUTV. Fl. Ochotens. Phaenog. p. 98; MEINSHAUS. l. c.). However, as the plants were past flowering, I have not been able to measure the anthers with absolute certainty. Specimens from Ust Algiac are large and vigorous, with fruits from 2,5 to 3 mm. long, of a brownish colour. The leaf-sheaths are not much swollen.

Distribution: The species is distributed in northern and central Europe (and also in northern Italy and Bulgaria), south-western Asia, Siberia, northern Mongolia, Sakhalin, Japan, North America, Greenland.

Eriophorum angustifolium Roth, Tent. Fl. Germ. II (1793) p. 63; Ledeb. Fl. Ross. IV, p. 254; Turczan. Fl. Baical.-Dahur. (1855, II) p. 318, no. 1216; Крыл. Фл. Алт. VI (1912) p. 1437. *Eriophorum polystachion* L. Spec. Pl. ed. II (1762) p. 76; Ledeb. Fl. Alt. I, p. 71; Turczan. Cat. Baical. no. 1203.

Very common in the swamps at Ust Kamuishto, where it varies considerably as to the length of the culms, the breadth of the leaves, and the length of the bristles, etc. I have colected forms with very long-stalked spikelets, f. *laxum* MERT. et KOCH, Deutschl. Fl. I (1823) p. 456, and forms with quite sessile spikelets, f. *Vaillanti* (POIT. et TURP.) DUBY, Bot. Gall. (1828) p. 487. In the Altaian, at an altitude of about 2100 m. above sea-level, I have collected one form with lower culms, only from 25 to 30 cm. high, and 3,

rather small spikelets, of which one is nearly sessile, the two others with long, drooping, glabrous stalks. Leaves are generally 2, with short and imperfectly developed laminas, which, like the basal leaves, are nearly quite withered at the time of the ripening of the fruit. The nut is comparatively narrower than in the typical form. This one probably belongs to f. *alpinum* GAUD. Synops. Fl. Helveticae I (1828) p. 313.

Distribution: Europe, except the southern portions, Caucasia, Siberia, northern Mongolia, eastern Asia, South Africa, North America, Greenland.

Eriophorum gracile Koch in Roth, Catalect. II (1800) p. 259; Turczan. Cat. Baical. no. 1202; Ledeb. Fl. Ross. IV, p. 255; Turczan. Fl. Baical.-Dahur. (1855, II) p. 318, no. 1217; Крыл. Фл. Алт. VI (1912) p. 1439.

In swampy bogs, near Kushabar.

Distribution: Northern and middle Europe, Siberia, eastern Asia, North America.

Araceae NECK.

Calla palustris L. Spec. Pl. ed. II (1763) p. 1373; Ledeb. Fl. Alt. IV, p. 178; Turczan. Cat. Baical. no. 1182; Ledeb. Fl. Ross. IV, p. 11; Turczan. Fl. Baical.-Dahur. (1854, II) p. 70, no. 1099; Крыл. Фл. Алт. VI (1912) p. 1260.

Scattered in swampy, muddy places in the forests between Kushabar and Petropawlowsk. Flowering in July.

Distribution: Northern and middle Europe to eastern France, Siberia, Sakhalin, Manchooria, North America.

Acorus Calamus L. Spec. Pl. ed. II (1762) p. 462; Ledeb. Fl. Alt. II, p. 40; Turczan. Cat. Baical. no. 1183; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 879; Turczan. Fl. Baical.-Dahur. (1854, II) p. 71, no. 1100; Ledeb. Fl. Ross. IV, p. 13; Крыл. Фл. Алт. VI (1912) p. 1261.

On the borders of the swamps on the Dora Steppe, near Mosgalewski. Some specimens in flower in the middle of August.

Distribution: Europe, northwards to southern Scandinavia, and southwards to northern Mongolia, eastern Asia, Japan, India, Ceylon, North America.

Lemnaceae DUMORT.

Lemna minor L. Spec. Pl. ed. II (1763) p. 1376; Ledeb. Fl. Alt. I, p. 43; Turczan. Cat. Baical. no. 1185; Ledeb. Fl. Ross. IV, p. 16; Turczan. Fl. Baical.-Dahur. (1854, II) p. 68, no. 1097; Крыл. Фл. Алт. VI (1912) p. 1262.

In swamps, etc., here and there about Minusinsk, and by the road towards Kushabar.

Distribution: Nearly all over the globe, except the arctic regions.

Juncus bufonius L. Spec. Pl. ed. II (1762) p. 466; Ledeb. Fl. Alt. II, p. 48; Turczan. Cat. Baical. no. 1166; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 875; Ledeb. Fl. Ross. IV, p. 231; Turczan. Fl. Baical.-Dahur. (1855, II) p. 305, no. 1195; Buchenau, *Juncaceae* in Engl. Pflanzenr. H. 25 (IV, 36, 1906) p. 105; Крыл. Фл. Алт. VI (1912) p. 1404.

Very common in the explored tracts of Siberia and the Urjankai country, where occurring on moist ground, along roads, in court-yards, along borders of fields, etc., and flowering from June to August. Besides f. *typicus* ASCHERS. et GRAEBN. Synops. Mitteleurop. Fl. II, 2 (1904) p. 421, there also occur forms with very low stems, and several flowers densely congested, f. *fasciculatus* KOCH, Synops. ed. I (1837) p. 732.

At Ust Kamuishto, I have collected a form of this one, with low stems, from 4 to 13 cm. high, and which is especially distinguished by having the inner perianth leaves considerably shorter than the outer ones, and generally somewhat more obtuse at the summit, but never distinctly rounded. The outer perianth leaves are 4 to 5 mm. long, always markedly longer than the capsule, tapering upwards, and finely mucronate, furnished with a distinct dorsal nerve drawn out into a fine point. The inner perianth is 2—3 mm. long, equalling or a little shorter than the ripe capsules, and with a midrib not quite levelling the summit of the leaf, which is scarious-margined. The flowers are either single or 2—3 together. The ripe capsule is light straw-coloured, not of a chestnut colour. The lower leaf-sheaths have a more or less markedly reddish tinge. This form approaches much var. *halophilus* FERNALD et BUCHENAU in Rhodora VI (1904) p. 39, and is possibly identical with f. *ranarius* SONGEON et PERRIER in BILLOT, Annotations Fl. France et Allem. (1859) p. 192, which is considered by BUCHENAU, l. c., to be intermediate between var. *genuinus* and var. *halophilus*. The soil at Ust Kamuishto is slightly saline.

Distribution: Nearly all over the globe, except the most frigid regions.

Juncus compressus Jacq. Enum. Stirp. Vindobon. (1762) p. 60 et 235; Buchenau, *Juncaceae* in Engl. Pflanzenr. H. 25 (IV, 36, 1906) p. 111; Ledeb. Fl. Ross. IV, p. 229; Turczan. Fl. Baical.-Dahur. (1855, II) p. 304, no. 1193; Крыл. Фл. Алт. VI (1912) p. 1408. *Juncus bulbosus* L. Spec. Pl. ed. II (1762) p. 466; Ledeb. Fl. Alt. II, p. 48; Turczan. Cat. Baical. no. 1167; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 876.

Rather common in moist meadows, along road-sides, etc. about Minusinsk, Ust Abakansk, Ust Kamuishto, Askys, and Kushabar. Flowering and with ripe fruits in June and July.

Distribution: Europe, and temperate portions of Asia.

Juncus Gerardii Loiseleur in Journ. de Bot. III (1809) p. 294; Buchenau, *Juncaceae* in Engl. Pflanzenr. H. 25 (IV, 36, 1906) p. 112; Ledeb. Fl. Ross. IV, p. 229; Крыл. Фл. Алт. VI (1912) p. 1409. *Juncus botnicus* Wahlenb. Fl. Lapp. (1812) p. 11; Ledeb. Fl. Alt. II, p. 49; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 877.

Rather common in the territory explored, partly together with the preceding one at Ust Abakansk, Ust Kamuishto, and Askys. At Ust Kamuishto, I have collected a series of forms that seemed to constitute transitions to the preceding one, and probably being of a hybrid nature (HAUSKNECHT in Mitt. Geogr. Ges. Thür. II (1884) p. 217).

Distribution: Europe, central Asia to China, north-western Africa, North America.

In the material brought home there may, besides the typical form, (var. *typicus* BUCHENAU in Engl. Jahrb. XII (1890) p. 188) be distinctly separated the following 2 types, between which, however, there are to be found numerous intermediate forms.

subspec. **atrifuscus** (Rupr.) Trautv. in Bull. Soc. Nat. Moscou (1867) p. 110. *Juncus bulbosus* L. var. *atrofuscus* Regel in Bull. Soc. Nat. Moscou (1868) p. 272.

This subspecies, which is especially characterized by its loose, generally rather long-stalked flowers, and nearly black perianth leaves, I have collected on the Abakan Steppe, near Askys. In full flower in the middle of June.

Distribution: Subarctic regions, and the salt steppes of the interior of Asia.

subspec. **salsuginosus** (Turczan.) Buchenau in Engl. Jahrb. XII (1890) p. 189. *Juncus salsuginosus* Turczan. Cat. Baical. no. 1164; Ledeb. Fl. Ross. IV, p. 230; Turczan. Fl. Baical.-Dahur. (1855, II) p. 304, no. 1194; Крыл. Фл. Алт. VI (1912) p. 1409.

This subspecies has rather dense flowers, partly congested in a head, whereby this form, in point of external habitus, is apt to be confounded with *Juncus alpinus*. Occurs in moist grass-field in depressions on the Abakan Steppe, here and there together with the preceding one.

Distribution: The steppe area of central Asia.

Juncus filiformis L. Spec. Pl. ed. II (1762) p. 465; Buchenau, *Juncaceae* in Engl. Pflanzenr. H. 25 (IV, 36, 1906) p. 127; Ledeb. Fl. Alt. II, p. 46; Turczan. Cat. Baical. no. 1162; Ledeb. Fl. Ross. IV, p. 223; Turzan. Fl. Baical.-Dahur. (1855, II) p. 302, no. 1190; Крыл. Фл. Алт. VI (1912) p. 1410.

Not unfrequently to be found at Kushabar, near Ust Algiac, on the Sisti-kem, and at Ust Tara-kem, in moist, grassy places. With young flowers in the middle of July.

The specimens collected are large and vigorous, to 0,5 m. high, few-flowered, to 7-flowered (f. *typicus* KRYLOW, Фл. Алт. VI (1912) p. 1411).

Distribution: Europe, except the more southern portions, south-western Asia, Siberia, northern Mongolia, Sakhalin, North and South America, Greenland.

Juncus triglumis L. Spec. Pl. ed. II (1762) p. 467; Buchenau, *Juncaceae* in Engl. Pflanzenr. H. 25 (IV, 36, 1906) p. 224; Ledeb. Fl. Alt. II, p. 50; Turczan. Cat. Baical. no. 1169; Ledeb. Fl. Ross. IV, p. 233; Turczan. Fl. Baical.-Dahur. (1855, II) p. 306, no. 1197; Крыл. Фл. Алт. VI (1912) p. 1415.

In the Altaian, above the tree limit, in moist, grassy places. In full flower at the end of July.

The bractlets are ovate, subobtuse at the top, of a dark brown, ½ to ⅔ as long as the flowers. The leaves are comparatively broad, 1 to 1,5 mm. The stems are solitary, generally not tufted.

Distribution: Arctic and alpine tracts of Europe, south-western and central Asia, Siberia, northern Mongolia, North America, Greenland.

Luzula pilosa (L.) Willd. Enum. Pl. Hort. Berol. (1809) p. 393; Ledeb. Fl. Ross. IV, p. 214; Крыл. Фл. Алт. VI (1912) p. 1397. Buchenau, *Juncaceae* in Engl. Pflanzenr. H. 25 (IV, 36, 1906) p. 48. *Luzula vernalis* DC., Ledeb. Fl. Alt. II, p. 44; Turczan. Cat. Baical. no. 1171.

Scattered in the subalpine taiga territory about the Upper Amyl.

Distribution: Northern and middle Europa, Trans Caucasia, Siberia, in the Yenisei valley to 68° north latitude, and eastwards to Lake Baikal.

Luzula multiflora (Ehrh.) Lejeune, Fl. Envir. Spa I (1811) p. 169. *Luzula campestris* DC. var. *multiflora* Celak. Prodr. Fl. Bøhmen (1869) p. 85; Buchenau, *Juncaceae* in Engl. Pflanzenr. H. 25 (IV, 36, 1906) p. 94; Крыл. Фл. Алт. VI (1912) p. 1400. *Luzula campestris β erecta* Ledeb. Fl. Alt. II, p. 45; Turczan. Cat. Baical. no. 1173. *Luzula campestris β* in Ledeb. Fl. Ross. IV, p. 219; Turczan. Fl. Baical.-Dahur. (1855, II) p. 300, no. 1187.

The specimens collected are characteristic in having the stems vigorous, to ½ m. high, glabrous, moreover in having the leaves rather broad, 4—6 mm., completely glabrous, even the orifices of the sheats being destitute of tufts of hairs. The flower cluster is made up of numerous, small, globular, and few-flowered spikes, 10 to 15 in number, on stiff, erect peduncles, to 5 cm. long. The lowest bract foliose, equalling or even exceeding the inflorescence. The capsule is of the same length as the perianth.

Occurring in the Altaian, near the tree limit, with ripe capsules at the end of July. I have also observed the species near Ust Sisti-kem and at Ust Kamsara.

Distribution: Temperate portions of Europe and Asia, North America, Australia.

Luzula confusa Lindeberg in Nya Botaniska Notiser (1855) p. 9; Buchenau, *Juncaceae* in Engl. Pflanzenr. H. 25 (IV, 36, 1906) p. 70. *Luzula arcuata* var. *γ* in Buchenau, Monogr. *Juncac.* (1890) p. 125. *Luzula arcuata* Wahlenb. in Ledeb. Fl. Ross. IV, p. 218 ex parte.

Rather common in the Altaian, above the tree limit, in moist, mossy and grass-grown places.

Taken with nearly ripe fruits at the end of July. The material collected agrees perfectly with Scandinavian specimens.

Distribution: Arctic regions of the old and new world, in more southerly tracts only on lofty mountains.

Luzula frigida (Buchenau) Samuelsson in Lindman, Svensk Fanerogamflora (1918) p. 161. *Luzula campestris* L. var. *frigida* Buchenau, Oesterr. Bot. Zeitschr. (1898) p. 284.

This one, which is set up first as a distinct species by GUNNAR SAMUELSSON in 1918, I have found to be rather common in the Altaian, where collected by me in grass-grown places, above the tree limit, at an altitude of about 2000 m. above sea-level, with ripe capsules at the end of July. The author, who has revised my material, informs me that my specimens taken here agree perfectly with the typical form.

Distribution: Europe (Scandinavia and the Alps), Sayansk mountains, China.

Luzula spec. *(an nova?)*

L. multiflorae valde affinis, sed differt tepalis fuconigris, capsulis acuminatis, stylis brevioribus.

In alpine tracts of the Altaian I have found some specimens most likely belonging to a new species allied to *L. multiflora*, but differing from the typical European one by its darker perianth leaves, pointed capsule, and shorter style.

Taken together with the two preceding ones in grass-grown places, with ripe fruits at the end of July.

In exotic tracts are no doubt to be found a whole succession of obscure forms belonging to the *Luzula campestris* group. Several of these may be new species, but the material is to insignificant to allow a reliable decision.

Liliaceae DC.

Veratrum album L. Spec. Pl. ed. II (1763) p. 1479; Ledeb. Fl. Alt. II, p. 62; Turczan. Cat. Baical. no. 1160; Karel. et Kiril. Enum. Pl. Fl. Alt. 871; Ledeb. Fl. Ross. IV, p. 208; Turczan. Fl. Baical.-Dahur. (1855, II) p. 294, no. 1181; Крыл. Фл. Алт. VI (1912) p. 1395.

Dispersed in the Amyl valley, but much rarer than the following subspecies.

subspec. **Lobelianum** (Bernh.) Reichenb. Fl. German. Excurs. I (1830) p. 97; Ledeb. l. c.

Occurring in moist, grass-grown places in the taiga, about the Upper Amyl, the Algiac and Sisti-kem rivers, where, in places, being one of the most characteristic plants. The species begins flowering about the middle of July.

Distribution: Europe, north-western Asia, Siberia, northern Mongolia, eastern Asia.

Zygadenus sibiricus (Kunth) Asa Gray, Melanth. in Ann. Lyc. Hist. Nat. New-York IV (1837) p. 112; Крыл. Фл. Алт. VI (1912) p. 1392. *Anticlea sibirica* Kunth, Enumerat. IV, p. 121; Ledeb. Fl. Ross. IV, p. 207; Turczan. Fl. Baical.-Dahur. (1855, II) p. 292, no. 1179. *Leimanthium sibiricum* Schult. Syst. Veget. VIII, p. 1551; Turczan. Cat. Baical. no. 1158.

In woods of *Larix sibirica* and *Pinus silvestris*, near the mouth of the Sisti-kem. Nearly past flowering at the beginning of August.

Distribution: Southern portion of the government of Perm in European Russia, Siberia, northern Mongolia, Manchooria.

Hemerocallis flava L. Spec. Pl. ed. II (1762) p. 462; Ledeb. Fl. Alt. II, p. 39; Turczan. Cat. Baical. no. 1140; Ledeb. Fl. Ross. IV, p. 194; Turczan. Fl. Baical.-Dahur. (1854, II) p. 128. no. 1176; Крыл. Фл. Алт. VI (1912) p. 1391.

Very common about the river Abakan, on the banks as well as the islets, where occurring in open brush-wood, natural meadows, and the like places. Begins flowering about the middle of June. I have also observed it in the Urjankai country, here and there on the Sisti-kem and the Bei-kem.

Distribution: Southern Europe from south-eastern France, the Caucasus, northern Mongolia, China, Japan.

Lloydia serotina (L.) Reichenb. Fl. German. Excurs. I (1830) p. 102; Ledeb. Fl. Ross. IV, p. 144; Turczan. Fl. Baical.-Dahur. (1854, II) p. 114, no. 1156; Крыл. Фл. Алт. VI (1912) p. 1357. *Nectarobothrium striatum* Ledeb. Fl. Alt. II, p. 36. *Anthericum serotinum* L. Spec. Pl. ed. II (1762) p. 444; Turczan. Cat. Baical. no. 1141.

Scattered in sandy and gravelly places, among grass and mosses in the Altaian, at altitudes of about 2000 m. above sea-level. In full flower at the end of July. The specimens gathered are uniflorous, from 20—25 cm. high, with three to four cauline leaves. The basal leaves overtopping the stem, to 30 cm. long, and 1,5 mm. broad. The stamens are comparatively short, scarcely reaching the middle of the perianth. On Reichenbach's figure in Icones Fl. German. X, fig. 972, they are considerably longer, only ⅛ to ¼ shorter than the perianth.

Distribution: Middle Europe, southwards to northern Italy, the Caucasus, central Asia, northern Mongolia, south-eastern Siberia, Novaya Zemlya, northern Siberia, New Siberian islands, North America.

Erythronium dens canis L. Spec. Pl. ed. II (1762) p. 437 ex parte; Ledeb. Fl. Alt. II, p. 37; Ledeb. Fl. Ross. IV, p. 133; Крыл. Фл. Алт. VI (1912) p. 1345.

In thickets, near Ust Sisti-kem; past flowering about the middle of August.

Distribution: Middle and southern Europe, Caucasia, Siberia, northern Mongolia, Japan, North America.

Allium odorum L. Mant. I (1767) p. 62; Regel, *All.* Adh. Cogn. Monogr. p. 175; Regel, *All.* Turkest. p. 86; Ledeb. Fl. Alt. II, p. 15; Turczan. Cat. Baical. no. 1153; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 858; Ledeb. Fl. Ross. IV, p. 185; Turczan. Fl. Baical.-Dahur. (1854, II) p. 127, no. 1175; Крыл. Фл. Алт. VI (1912) p. 1387.

Dispersed on the steppes about Ust Kamuishto, where especially occurring in very dry places, and in saliferous soil. The stems are rather stout and vigorous, 3 to 4

mm. in diameter. The leaves from 3 to 6 mm. broad, and usually not quite so long as the stems. Length of the perianth generally 6 mm., rarely up to 8 mm. Gathered with young flowers, some of them not full-blown, in the second half of June.

Distribution: Eastern Turkestan, and central Asia, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan.

Allium Victorialis L. Spec. Pl. ed. II (1762) p. 424; Regel, *All.* Adh. Cogn. Monogr. p. 170; Ledeb. Fl. Alt. II, p. 8; Turczan. Cat. Baical. no. 1152; Ledeb. Fl. Ross. IV, p. 184; Turczan. Fl. Baical.-Dahur. (1854, II) p. 127, no. 1174; Крыл. Фл. Алт. VI (1912) p. 1386.

Scattered in the subalpine woods, among conifers, and in thickets of foliferous trees, about the Upper Amyl and in the Altaian, where I have collected it up to altitudes of about 2000 m. above sea-level. The leaves of the specimens gathered are rather narrow, from 2—3 cm. broad, and the length 5—7 times the breadth. The summits of the perianth-segments are rather acute, length 6 mm., breadth about ⅓ of length. In full flower in July.

Distribution: Southern and middle Europe, the Caucasus, Siberia, central Asia, northern Mongolia, Sakhalin, Japan, north-western America.

Allium clathratum Ledeb. Fl. Alt. II, p. 18; Ledeb. Fl. Ross. IV, p. 178; Regel, *All.* Adh. Cogn. Monogr. p. 173; Regel, *All.* Asiae Central. p. 343; Крыл. Фл. Алт. VI (1912) p. 1384.

A few specimens of a very young *Allium*, gathered on the grassy steppes near Askys, probably belong to this species. The specimens being very young, with flower clusters not exceeding a few mm. in length, a reliable decision is difficult, it being just possible that they may have to be referred to a narrow-leaved form of the nearly allied *A. lineare* L. The narrow, fine leaves in the specimens, however, are characteristic of *A. clathratum*, though both the species in the breadth of the leaves are connected with intermediate forms.

Distribution: Southern portions of central Siberia, and adjoining portions of Mongolia.

Allium lineare L. Spec. Pl. ed. II (1762) p. 423; Ledeb. Fl. Alt. II, p. 6; Turczan. Cat. Baical. no. 1150; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 882; Ledeb. Fl. Ross. IV, p. 178; Turczan. Fl. Baical.-Dahur. (1854, II) p. 122, no. 1166; Regel, *All.* Adh. Cogn. Monogr. p. 166; Regel, *All.* Asiae Centr. p. 344; Крыл. Фл. Алт. VI (1912) p. 1383. *Allium strictum* Schrad. Hort. Goetting. (1809) Tab. 1; Ledeb. l. c.; Regel, Monogr. p. 164. *Allium splendens* Willd. Herb. no. 6477; Ledeb. l. c.; Regel, Monogr. p. 168; Turczan. l. c. (1854, II) p. 123, no. 1168.

Of this species I have only one specimen in my collections, taken in dry meadows, between Karatus and Kushabar. In full flower about the middle of July.

Distribution: Middle Europe, southern Russia, south-western and central Asia, Siberia, northern Mongolia, eastern Asia, Sakhalin.

Allium tenuissimum L. Spec. Pl. II (1762) p. 433; Ledeb. Fl. Alt. II, p. 23; Turczan. Cat. Baical. no. 1146; Ledeb. Fl. Ross. IV, p. 183; Regel, *All.* Adh. Cogn. Monogr. p. 157; Turczan. Fl. Baical.-Dahur. (1854, II) p. 126, no. 1173; Крыл. Фл. Алт. VI (1912) p. 1380. (Non *Allium tenuissimum* Habl.).

Common on the Abakan Steppe, near Askys, especially on dry, hot, stony slopes, where gathered by me in full flower in the middle of June.

subspec. **anisopodium** (Ledeb.) Regel, l. c. *Allium anisopodium* Ledeb. Fl. Ross. IV, p. 183; Turczan. Fl. Baical.-Dahur. (1854, II) p. 126, no. 1172; Крыл. l. c. p. 1380. *Allium tenuissimum* var. Turczan. Cat. Baical. no. 1146.

Scattered on the Abakan Steppe, between Askys and Ust Abakansk, where it begins flowering at the end of June.

Distribution: Southern Siberia, Mongolia, southwards to Tibet, northern China, and Manchooria.

Allium albidum Fish. Cat. Hort. Gorenk. (1812) p. 10; Ledeb. Fl. Ross. IV, p. 181; Regel, *All.* Adh. Cogn. Monogr. p. 151; Regel, *All.* Turkest. p. 77; Regel, *All.* Asiae Centr. p. 337; Крыл. Фл. Алт. VI (1912) p. 1379.

On dry, stony slopes, between Minusinsk and Ust Abakansk. With young flowers in June.

Distribution: Eastern Austria, middle and southern Russia, Trans Caucasia, eastern Turkestan, Siberia, north-western Mongolia.

Allium Stellerianum Willd. Spec. Pl. II, p. 82; Ledeb. Fl. Alt. II, p. 24; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 869; Ledeb. Fl. Ross. IV, p. 181; Regel. *All.* Adh. Cogn. Monogr. p. 149; Regel, *All.* Turkest. p. 76; Regel, *All.* Asiae Centr. p. 337; Крыл. Фл. Алт. VI (1912) p. 1378.

In gravelly and grass-grown places, between Ust Abakansk and Minusinsk. With young flowers at the end of June.

Distribution: Eastern Russia, Turkestan, Siberia, except the extreme eastern portions, northern Mongolia.

Allium senescens L. Spec. Pl. ed. II (1762) p. 430; Ledeb. Fl. Alt. II, p. 12; Ledeb. Fl. Ross. IV, p. 180; Regel, *All.* Adh. Cogn. Monogr. p. 137; Regel, *All.* Asiae Centr. p. 336; Turczan. Fl. Baical.-Dahur. (1854, II) p. 124, no. 1169; Крыл. Фл. Алт. VI (1912) p. 1376. *Allium glaucum* Turczan. Cat. Baical. no. 1148.

On dry, waste steppe on the Ulu-kem, near Bjelosarsk. Past flowering at the end of August. As the flowers are wanting, it is difficult to decide to which variety of this polymorphous species the specimens should be referred.

Distribution: Middle Europe up to southern Scandinavia (Sleswick), south-western and central Asia, Siberia, northern Mongolia, eastern Asia, Japan.

Allium Schoenoprasum L. Spec. Pl. ed. II (1762) p. 432; Ledeb. Fl. Alt. II, p. 17; Turczan. Cat. Baical. no. 1142; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 861; Ledeb. Fl. Ross. IV, p. 166; Regel, *All.* Adh. Cogn. Monogr. p. 77; Regel, *All.* Turkest. p. 43; Regel, *All.* Asiae Centr. p. 306; Turczan. Fl. Baical.-Dahur. (1854, II) p. 119, no. 1162; Крыл. Фл. Алт. VI (1912) p. 1367.

subspec. **typicum** Regel, *All.* Adh. Cogn. Monogr. p. 77.

Very common in the Altaian, in moist, grass-grown, and partly irrigated habitats, where, in places, nearly exclusively covering the ground over large tracts. The stems generally 20 to 30 cm. high, with one very short leaf, at a height from the ground of about one third of the stem. Gathered in full flower at the end of July.

Distribution: Europe, Caucasia, south-western and central Asia, Siberia, northern Mongolia, eastern Asia, Japan, North America.

Lilium Martagon L. Spec. Pl. ed. II (1762) p. 435; Ledeb. Fl. Alt. II, p. 38; Turczan. Cat. Baical. no. 1136; Ledeb. Fl. Ross. IV, p. 149; Turczan. Fl. Baical.-Dahur. (1854, II) p. 116, no. 1158.

subspec. **pilosiusculum** Freyn, Plantae Karoanae (Oesterr. Bot. Zeitschrift XL (1890) p. 224; Крыл. Фл. Алт. VI (1912) p. 1361.

Scattered on the Abakan Steppe, near Askys, in not too dry, grass-grown places, accompanying *Adenophora liliifolia, Atraphaxis frutescens,* and others, where gathered flowering in the second half of June. Rather common in woods and thickets of foliferous trees in the Urjankai country, ascending in alpine situations to above the limit of tree vegetation. Ust Sisti-kem, the Kamsara, on the Tara-kem, and near the Dora Steppe.

The bulb, being about 5 cm. long, is used for food by the natives of the Urjankai country. It is drawn up by means of an instrument especially made for the purpose, and after being dried by the sun, is mixed up with reindeer's or cow's milk. Such dried roots are called «Kandick». The bulb of *Erythronium dens canis* L. is employed in the same way.

The specimens gathered are distinguished by their comparatively narrow leaves, from 7—9 cm. long, and on an average from 12—18 mm. broad. The Siberian specimens of this species which I had occasion to see in the herbarium of the Imperial Botanical Gardens in Petrograd, have also mostly the leaves narrower than the Norwegian material I have had for comparison. The upper parts of the plants and the outside of the perianth leaves are more or less densely covered with long, tattered hairs. The leaf-like bracts are more or less densely hairy, in particular underneath and at the margin. The leaves usually hairy only at the margin. These marginal hairs are gradually reduced downwards, appearing only as small papillae at the margin of the lower leaves.

Distribution: Europe, Trans Caucasia, Turkestan, Siberia, northwards towards 69° in latitude, northern Mongolia, Japan (an culta?).

Asparagus Pallasii nov. nom. *Asparagus maritimus* Pall. Reise II (1773) p. 329; Ledeb. Fl. Alt. II, p. 44; Ledeb. Fl. Ross. IV, p. 198; Крыл. Фл. Алт. VI (1912) p. 1342.

The name of *Asparagus maritimus* was already applied by MILLER in 1768 in The Gardener's Dictionary ed. VIII, no. 2, to another species, which, therefore, according to the principle of priority, is entitled to this name. I therefore enter PALLAS's species of 1773 as *Asparagus Pallasii*.

Scattered on the steppes in the vicinity of Minusinsk, as well as on the steppes on the Ulu-kem, near Chakul. With flowers, and in part past flowering, at the beginning of July.

Distribution: South-western Asia, south-western Siberia, northern Mongolia.

Majanthemum bifolium (L.) F. W. Schmidt, Fl. Boëm. Cent. IV (1794) p. 55; Ledeb. Fl. Alt. IV, p. 333; Крыл. Фл. Алт. VI (1912) p. 1338. *Smilacina bifolia* Desf., Turczan. Cat. Baical. no. 1130; Ledeb. Fl. Ross. IV, p. 127; Turczan. Fl. Baical.-Dahur. (1854, II) p. 109, no. 1150.

Scattered in the subalpine woods about the Upper Amyl, especially in somewhat moist places, in thickets, etc., near Ust Algiac, on the Upper Sisti-kem, on the Tara-kem. Flowerless specimens occur here and there, with only one long-petioled leaf. The flower-bearing stem, therefore, is not always developed every year. With flowers in July, and fruits in August.

Distribution: Europe, except the extreme southern portions, Siberia, northwards to about the arctic circle, northern Mongolia, eastern Asia.

Polygonatum officinale Allioni, Fl. Pedemontana I (1785) p. 131; Ledeb. Fl. Ross. IV, p. 123. Turczan. Fl. Baical.-Dahur. (1854, II) p. 107, no. 1147; Крыл. Фл. Алт. VI (1912) p. 1335. *Convallaria Polygonatum* L. Spec. Pl. ed. II (1762) p. 451; Ledeb. Fl. Alt. II, p. 41. *Polygonatum vulgare* Turczan. Cat. Baical. no. 1126; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 841.

Rather common in meadows, and thickets of foliferous trees on the islets in the Yenisei, near Minusinsk, where it begins flowering in the early days of June. Besides the typical form, with stems from 30—40 cm. high, and with half enclosing leaves, I have, near Kushabar, collected a rather rich material of a much more vigorous form. Stems to 75 cm. high, quite glabrous, from 5 to 8 mm. in diameter below, where distinct marks of lower scales fallen off early. Leaves large, elliptic, to 16 cm. long, and 6 cm. broad, mostly tapering below towards a short, but rather distinct, channelled petiole, up to 0,5 cm. long. Peduncles drooping, rather thick, completely glabrous, angular, to 3 cm. long, one-flowered, rarely branching and two-flowered. Peduncles occasionally bearing a single scale, very small, and linear, only 1—2 mm. long. Perianth tube 18 mm. long, 5—7 mm. in diameter. In point of external habitus, this form resembles rather much *Polygonatum multiflorum*, but is markedly distinguished from the latter by the stem, scaly below, one- (rarely two-) flowered peduncle, and quite glabrous filaments. I have also observed the species in thickets near Ust Kamsara.

Distribution: Europe, except the extreme north and south, Siberia, northern Mongolia, eastern Asia, Japan, Sakhalin.

Paris quadrifolius L. Spec. Pl. ed. II (1762) p. 526; Ledeb. Fl. Alt. II, p. 88; Ledeb. Fl. Ross. IV, p. 120; Крыл. Фл. Алт. VI (1912) p. 1333.

Scattered in shady places in the subalpine woods about the Upper Amyl. With young fruits in the first half of July.

Distribution: Europe, except the extreme south, Asia Minor, Siberia, eastwards to about the Yenisei.

Iris flavissima Pall. Reise III (1776) p. 715; Ledeb. Fl. Alt. IV, p. 332; Turczan. Cat. Baical. no. 1122; Ledeb. Fl. Ross. IV, p. 102; Maxim. Diagn. Pl. Nov. Asiat. III, p. 725; Turczan. Fl. Baical.-Dahur. (1854, II) p. 101, no. 1140; Крыл. Фл. Алт. VI (1912) p. 1329.

Rather common in the regions about the river Abakan, frequently on sandy banks of rivers, and the like. Specimens gathered on the islets in the lower parts of that river, at the end of June, are nearly past flowering, a few with almost ripe fruits.

Distribution: South-eastern Europe, south-western and central Asia, southern Siberia, northern Mongolia, eastern Asia.

Iris ruthenica Aiton, Hort. Kewensis ed. I (1810) p. 117; Ledeb. Fl. Alt. I, p. 55; Turczan. Cat. Baical. no. 1117; Bongard et Meyer, Suppl. Fl. Alt. no. 294; Ledeb. Fl. Ross. IV, p. 94; Turczan. Fl. Baical.-Dahur. (1854, II) p. 97, no. 1134; Крыл. Фл. Алт. VI (1912) p. 1324.

Rather common on the steppes between Minusinsk and Ust Abakansk, on grass-grown hill-slopes, in thickets of *Caragana arborescens*, here and there associated with *Solidago Virgaurea, Aster alpinus, Stellaria graminea*, and others. In full bloom at the beginning of June.

Distribution: South-western Asia, Siberia, northern Mongolia, northern China.

Iris ensata Thunb. in Act. Soc. Linn. II, p. 328; Maxim. Diagn. Pl. Nov. Asiat. III, p. 699; Крыл. Фл. Алт. VI (1912) p. 1323. *Iris biglumis* Wahl, Enumer. Plant. II, p. 149; Turczan. Cat. Baical. no. 1120; Ledeb. Fl. Ross. IV, p. 95; Turczan. Fl. Baical.-Dahur. (1854, II) p. 98, no. 1136. *Iris haematophylla* Bunge in Ledeb. Fl. Alt. I, p. 58. *Iris Pallasii* Bunge, Enum. Alt. p. 4.

Very common in the district about Minusinsk, where occurring in rather varied soil. Here and there, among sand, in the streets of the villages, and on the hills outside. On the Abakan Steppe covering in places nearly exclusively the ground, over tracts of land several square km. wide. Flowering in June and the first half of July.

Distribution: South-western and central Asia, Siberia, northern Mongolia, eastern Asia, Japan.

Orchidaceae JUSS.

Cypripedilum guttatum Swartz in Act. Acad. Holm. (1800) p. 251; Ledeb. Fl. Alt. IV, p. 174; Turczan. Cat. Baical. no. 1115; Ledeb. Fl. Ross. IV, p. 88; Turczan. Fl.

Baical.-Dahur. (1854, II) p. 95, no. 1132; Pfitzer, *Orchid.-Pleon.* in Engl. Pflanzenr. H. 12 (IV, 50, 1903) p. 32; Крыл. Фл. Алт. VI (1912) p. 1319.

Dispersed on the islets in the lower part of the river Abakan, especially in thickets, among grass, etc., and in thickets of foliferous trees near the Dora Steppe as well. Taken in full flower in June.

Distribution: Central and southern Russia, Siberia, northern Mongolia, eastern Asia, Sakhalin, North America.

Cypripedilum macranthum Swartz in Act. Acad. Holm. (1800) p. 250; Ledeb. Fl. Alt. IV, p. 174; Turczan. Cat. Baical. no. 1114; Ledeb. Fl. Ross. IV, p. 87; Turczan. Fl. Baical.-Dahur. (1854, II) p. 94, no. 1131; Pfitzer, *Orchid.-Pleon.* in Engl. Pflanzenr. H. 12 (IV, 50, 1903) p. 32; Крыл. Фл. Алт. VI (1912) p. 1318.

Rather common in the regions about the river Abakan, on the islets in the river, in thickets, among grass, and the like, in moist, grass-grown fields in depressions on the Abakan Steppe, near Askys, accompanying various sedges, *Orchis* etc., and near Ust Sisti-kem. Collected with flowers in the middle and at the end of July.

Distribution: Middle and southern Russia, Siberia, Sakhalin, Japan, eastern Asia, northern Mongolia, central Asia.

subspec. **ventricosum** (Swartz) Reichenb. Fl. German. Excurs. I (1830) p. 120; Pfitzer, l. c. p. 34; Крыл. l. c. p. 1319. *Cypripedilum ventricosum* Swartz, l. c. p. 251; Ledeb. Fl. Ross. IV, p. 87.

Only a few specimens observed on an islet in the river Abakan, near Askys. In full flower about the middle of June.

Distribution: Middle Russia, Siberia.

Plantanthera bifolia (L.) Reichenb. Fl. German. Excurs. I (1830) p. 120; Ledeb. Fl. Alt. IV, p. 171; Turczan. Cat. Baical. no. 1102; Ledeb. Fl. Ross. IV, p. 69; Turczan. Fl. Baical.-Dahur. (1854, II) p. 85; Крыл. Фл. Алт. VI (1912) p. 1315.

In somewhat dry, grass-grown thickets, near Kalna. Nearly past flowering about the middle of July.

Distribution: Europe, Asia Minor, Trans Baikal, Siberia, North Africa.

Coeloglossum viride (L.) Hartm. Handb. Skand. Fl. (1820) p. 329; Крыл. Фл. Алт. VI (1912) p. 1314. *Peristylis viridis* Lindl. Synops. Brit. Fl. (1829) p. 261; Ledeb. Fl. Ross. IV, p. 72. *Gymnadenia viridis* Rich., Ledeb. Fl. Alt. IV, p. 169; Turczan. Cat. Baical. no. 1100. *Platanthera viridis* Lindl., Turczan. Fl. Baical.-Dahur. (1854, II) p. 86, no. 1122.

In moist, grass- and moss-grown places on the river Algiac. Flowering in July.

Distribution: Europe, except the extreme south, Asia Minor and south-western Asia, Siberia, northern Mongolia, Sakhalin (var.), North America.

Gymnadenia conopea (L.) R. Br. in Aiton, Hort. Kewensis ed. II, V (1813) p. 191; Ledeb. Fl. Alt. IV, p. 169; Turczan. Cat. Baical. no. 1099; Ledeb. Fl. Ross. IV, p. 64; Turczan. Fl. Baical.-Dahur. (1854, II) p. 83, no. 1117; Крыл. Фл. Алт. VI (1912) p. 1311.

Dispersed in moist meadows, in depressions on the Abakan Steppe, near Askys, as well as near Ust Sisti-kem. With young flowers in the middle of June.

Distribution: Europe, south-western Asia, Siberia, northern Mongolia, eastern Asia, Sakhalin.

Herminium monorchis R. Br. in Aiton, Hort. Kewensis ed. II, V (1813) p. 191; Ledeb. Fl. Alt. IV, p. 171; Turczan. Cat. Baical. no. 1103; Ledeb. Fl. Ross. IV, p. 73; Turczan. Fl. Baical.-Dahur. (1854, II) p. 87, no. 1123; Крыл. Фл. Алт. VI (1912) p. 1310.

Common on the islets in the river Abakan, where most frequent in somewhat moist meadows, here and there associated with *Hemerocallis flava, Polygonum alpinum, Cypripedilum macranthum*, and others. The species varies somewhat in the height of the stem, the length and breadth of the leaves, the richness in flowers, etc. In full flower in June.

Distribution: Europe, except the extreme northern and southern portion, south-western and central Asia, Siberia, northern Mongolia, northern China.

Orchis simia Lam. Fl. Francaise III (1778) p. 507. *Orchis tephrosanthos* Villars, Hist. Pl. Dauph. II (1787) p. 32; Ledeb. Fl. Ross. IV, p. 62.

Scattered on the Abakan Steppe, near Askys, in grass-grown, frequently somewhat moist places, in thickets, and the like. In full bloom in the middle of June.

Distribution: Middle and southern Europe, south-western Asia, Siberia, North Africa.

Orchis militaris L. Spec. Pl. ed. II (1763) p. 1333; Ledeb. Fl. Alt. IV, p. 168; Turczan. Cat. Baical. no. 1094; Ledeb. Fl. Ross. IV, p. 61; Turczan. Fl. Baical.-Dahur. (1854, II) p. 80, no. 1112; Крыл. Фл. Алт. VI (1912) p. 1306.

In somewhat moist, grass-grown fields near Ust Kamuishto. Flowering in June.

Distribution: Europe, except the extreme north, Caucasia, Siberia, eastwards to Trans Baikal.

Orchis simia Lam. × **militaris** L., Grenier et Godron, Fl. France III (1856) p. 291; Timbal-Lagrave, Mem. Hybr. (1854) p. 18.

On the Abakan Steppe, in a moist, grass-grown depression on the river, near Askys, where rather common. The lower flowers of the spike open first, the upper ones, by degrees, later on *(f. simio-militaris* Timbal-Lagrave, l. c.)

In full flower in the middle of June.

Distribution: Middle Europe, southern Siberia. (The Abakan Steppe).

Orchis maculatus L. Spec. Pl. ed. II (1763) p. 1335; Ledeb. Fl. Alt. IV, p. 168; Turczan. Cat. Baical. no. 1096; Ledeb. Fl. Ross. IV, p. 58; Turczan. Fl. Baical.-Dahur. (1854, II) p. 82, no. 1116; Крыл. Фл. Алт. VI (1912) p. 1307.

subspec. **genuinus** Reichenb. Icon. Fl. German. XIII (1851) t. 51.

In moist, moss- and grass-grown ground, near Kushabar, and in several places in the Amyl valley. In full flower in the first half of July.

Distribution: Europe, except the extreme southern portions, Siberia.

Orchis latifolius L. Spec. Pl. ed. II (1763) p. 1334; Turczan. Cat. Baical. no. 1095; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 834; Ledeb. Fl. Ross. IV, p. 54; Turczan. Fl. Baical.-Dahur. (1854, II) p. 82, no. 1115; Крыл. Фл. Алт. VI (1912) p. 1308.

In moist, grass-grown fields, and in thickets on the river Abakan, near Askys. In full flower in the middle of June.

Distribution: Europe, south-western Asia, Siberia.

Orchis incarnatus L. Fl. Suecica ed. II (1755) p. 312; Ledeb. Fl. Ross. IV, p. 56.

The specimens gathered are characterized by comparatively short, vigorous stems, from 20 to 25 cm. long. The number of the leaves is 4—5, large and vigorous, to 15 cm. long, and 2,5 cm. broad, erect, generally reaching nearly to the summit of the spike. The spike is about 7 cm. long, narrowly ovoid. The lower bracts exceed the flowers in length, the upper ones being of about the same length as the flowers.

In swampy, grass-grown meadows on the river Abakan, near Askys, as well as on the islets in the river, near Ust Kamuishto. In full flower at the end of June.

Distribution: Europe, except the extreme south, temperate Asia.

Orchis Traunsteineri Sauter in Reichenb. Fl. German. Excurs. I (1830) p. 140. *Orchis latifolia* L. f. *angustifolia* Lindl., Gen. et Spec. Orchidac. Pl. (1830—40) p. 260; Ledeb. Fl. Ross. IV, p. 54.

subspec. **Friesii** Aschers. et Graebn. Synops. Mitteleur. Fl. III (1907) p. 726.

In moist, grass- and moss-grown places, near the river Abakan, between Askys and Ust Kamuishto and in moist, not unfrequently moss-grown meadows on the islets in the lower part of the river Abakan. In full flower at the end of June.

Distribution: The species occurs in northern and middle Europe, Siberia.

Goodyera repens (L.) R. Br. in Aiton, Hort. Kewensis ed. II, V (1813) p. 198; Ledeb. Fl. Alt. IV, p. 171; Turczan. Cat. Baical. no. 1105; Ledeb. Fl. Ross. IV, p. 86; Turczan. Fl. Baical.-Dahur. (1854, II) p. 92, no. 1129; Крыл. Фл. Алт. VI (1912) p. 1302.

In woods of conifers and foliferous trees, in shady, moss-clad places here and there between Ust Sisti-kem, the Kamsara, and the Dora Steppe. Nearly past flowering at the beginning of August.

Distribution: Europe, except the extreme southern portions, south-western and central Asia, southern Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North America.

Epipactis latifolia (Swartz) All. Fl. Pedemont. II (1785) p. 151; Ledeb. Fl. Alt. IV, p. 172; Turczan. Cat. Baical. no. 1106; Ledeb. Fl. Ross. IV, p. 83; Turczan. Fl. Baical.-Dahur. (1854, II) p. 90, no. 1127; Крыл. Фл. Алт. VI (1912) p. 1303.

In thickets of foliferous trees, near Kushabar. With young flowers about the middle of July.

Distribution: Europe, except the extreme north, south-western and central Asia, Siberia, eastern Asia, Sakhalin Japan, North Africa.

Spiranthes australis Lindl. Gen. et Spec. Orchidac. Pl. (1830—40) p. 463; Ledeb. Fl. Ross. IV, p. 84; Turczan. Fl. Baical.-Dahur. (1854, II) p. 92, no. 1128; Крыл. Фл. Алт. VI (1912) p. 1301. *Spiranthes amoena* Spreng. System. Vegetabil. III, p. 708; Ledeb. Fl. Alt. IV, p. 173; Turczan. Cat. Baical. no. 1109.

In my collection there occurs only one specimen of this species, gathered near Kushabar, on swampy ground, in brush-wood. The specimens, taken about the middle of July, bear young flower-buds. Spike hairy (*α spica pubescenti mediocri* Ledeb., l. c.).

Distribution: Siberia, central Asia, eastern Asia, Sakhalin, Japan, the East Indies, Australia, New Zealand.

Listera cordata (L.) R. Br. in Aiton, Hort. Kewensis ed. II, V (1813) p. 201; Ledeb. Fl. Ross. IV, p. 80; Крыл. Фл. Алт. VI (1912) p. 1300.

Scattered in the Urjankai country, in subalpine pine-woods, in moist, shady habitats, among mosses (*Polytrichum, Hypnum*, etc.). Specimens flowering at the end of July, found by me in the Altaian, at an altitude of 1600 m. above sea-level. Also observed in the taiga near Tshernoretska, Tshebertash, and at Utinski porog. In flower, and in part done flowering at the beginning of August.

Distribution: Europe, except the southern portions, Caucasia, Asia Minor, Siberia, northern Mongolia, Sakhalin, Japan, North America, Greenland.

Coralliorrhiza innata (L.) R. Br. in Aiton, Hort. Kewensis ed. II, V (1813) p. 208; Turczan. Cat. Baical. no. 1111; Ledeb. Fl. Ross. IV, p. 49; Turczan. Fl. Baical.-Dahur. (1854, II) p. 77, no. 1108; Крыл. Фл. Алт. VI (1912) p. 1297.

On moist, mossy ground, in thickets at Askys, near the river Abakan. Flowering in the middle of June. The species is also collected by me at Ust Ulgiac, in humid places in the taiga.

Distribution: Europe, Siberia, south-western and central Asia, North America, western Greenland.

Achroanthus monophyllos (L.) Greene, Pittonia II (1891) p. 183. *Microstylis monophyllos* (L.) Lindl. Gener. et Spec. Orchidac. Pl. (1830—40) p. 19; Ledeb. Fl. Ross. IV, p. 50; Крыл. Фл. Алт. VI (1912) p. 1295. *Malaxis monophyllos* Swartz in Act. Acad. Holm. (1800) p. 234; Ledeb. Fl. Alt. IV, p. 173; Turczan. Cat. Baical. no. 1112.

In swampy, moss-grown meadows, on the banks of the river Abakan, between Askys and Ust Kamuishto. With young flowers in the middle of June.

Distribution: Northern and eastern Europe, southern Siberia, eastern Asia, North America.

Salicaceae RICH.

Populus laurifolia Ledeb. Fl. Alt. IV, p. 297; Ledeb. Fl. Ross. III, p. 629; Крыл. Фл. Алт. V (1909) p. 1238. *Populus balsamifera* L. var. *laurifolia* Wesmael, Monogr. Gen. *Populus* p. 65, no. 16; Herder, Pl. Radd. (1892) p. 464, no. 189.

Very common on the banks and on the islets in the Yenisei and the river Abakan. Equally frequent in the Urjankai country, along the Bei-kem and the Ulu-kem, where, in the steppe regions, accompanying the following, constituting the bulk of the scarce tree vegetation along the banks. Found with nearly ripe fruits at the end of June.

Distribution: Southern Siberia, northwards to about 64° north latitude, where appearing as a shrub, only a few feet high, and eastwards to the government of Yeniseisk, northern Mongolia, Turkestan, Dzungaria.

Populus tremula L. Spec. Pl. ed. II (1763) p. 1464; Ledeb. Fl. Alt. IV, p. 296; Turczan. Cat. Baical. no. 1056; Ledeb. Fl. Ross. III, p. 627; Turczan. Fl. Baical.-Dahur. (1854, I) p. 398, no. 1054; Wesmael, Monogr. Gen. *Populus* p. 49, no. 4; Herder, Pl. Radd. (1892) p. 460, no. 188; Крыл. Фл. Алт. V (1909) p. 1236.

Common in the regions about the Yenisei and the river Abakan, scattered between Minusinsk and Kushabar, in subalpine wood regions about the Amyl. Also very common in the Urjankai country, for instance at Ust Algiac, the Kamsara, and on the banks of the rivers Bei-kem and Ulu-kem. In the Amyl taiga, south of Kushabar, forming groves of mighty, straight, branchless trunks, from 25 to 30 m. high, the summit only being furnished with a crown. In the Altaian, on the mountains, it does not seem to ascend so high as the conifers. Past flowering already in the middle of June.

Distribution: Europe, except the south-western portion of the Pyrenean Peninsula, Caucasia, Asia Minor, Russian Turkestan, Siberia, northwards to about 66° north latitude, northern Mongolia, eastern Asia, Sakhalin, North Africa.

Populus nigra L. Spec. Pl. ed. II (1763) p. 1464; Ledeb. Fl. Alt. IV, p. 296; Ledeb. Fl. Ross. III, p. 628; Herder, Pl. Radd. (1892) p. 466, no. 190; Крыл. Фл. Алт. V (1909) p. 1237.

Common on the banks of the Yenisei and Abakan rivers, and in moist meadows on the islets in the said rivers. Taken with partly ripe fruits in the second half of June. Scattered along the Bei-kem and the Ulu-kem.

Distribution: Europe, except the northern portions, (Scotland, Ireland, Scandinavia, northern Russia), south-western Asia to the Himalayas and Russian Turkestan, Siberia, northwards to 63° 15′ north latitude, and eastwards to the government of Yeniseisk.

Salix pentandra L. Spec. Pl. ed. II (1763) p. 1442; Anderss., Monogr. *Salic.* I (Kgl. Svenska Ventenskaps. Acad. Handl. VI (1867) p. 35; Wimmer, *Salic.* Europ. (1866) p. 22; Вольфъ, Матер. для изученія ивъ растущихъ дико̀въ Европ. Россіи I-въ Изв. Императ. С. Петерб. Лѣсн. Институт. IV (1900) п. 17; Вольфъ, Матер. для изуч. ивъ Азіат. Россіи I-въ Труд. С. Петерб.

Бот. Сад. XXI, п. 179. Ledeb. Fl. Alt. IV, p. 254; Turczan. Cat. Baical. no. 1013; Ledeb. Fl. Ross. III, p. 597; Turczan. Fl. Baical.-Dahur. (1854, I) p. 371, no. 1017; Herder, Pl. Radd. (1892) p. 397, no. 134; Крыл. Фл. Алт. V (1909) p. 1203.

In moist meadows, on the islets in the lower part of the river Abakan, as well as on the banks of the Bei-kem, near Ust Sisti-kem. Flowering at the beginning of June.

Distribution: Temperate parts of the old world, from England eastwards to Kamtchatka, in Siberia northwards to 64° north latitude.

Salix alba L. Spec. Pl. ed. II (1763) p. 1449; Wimmer, *Salic.* Europ. (1866) p. 16; Anderss. Monogr. *Salic.* I (1867) p. 47; Вольфъ, Ивы Европ. Россіи I (1900) п. 26; Вольфъ, Ивы Азіат. Россіи I, п. 185; Ledeb. Fl. Alt. IV, p. 255; Ledeb. Fl. Ross. III, p. 598; Крыл. Фл. Алт. V (1909) p. 1204.

On the banks of the Yenisei, near Ust Abakansk. Past flowering at the end of June.

Distribution: Europe, south-western Asia, eastwards to Turkestan, Dzungaria, Tibet and the Himalayas, Siberia, eastwards to about Lake Baikal, North Africa, North America (introduced).

Salix amygdalina L. Spec. Pl. ed. II (1763) p. 1443; Ledeb. Fl. Ross. III, p. 600; Turczan. Fl. Baical.-Dahur. (1854, I) p. 372, no. 1019. *Salix triandra* L. Spec. Pl. ed. II (1763) p. 1442; Anderss. Monogr. *Salic.* I (1867) p. 23; Wimmer, *Salic.* Europ. (1866) p. 12; Вольфъ, Ивы Европ. Россіи I, п. 7; Вольфъ, Ивы Азіат. Россіи I, п. 182; Ledeb. Fl. Alt. IV, p. 257; Turczan. Cat. Baical. no. 1014; Herder, Pl. Radd. (1892) p. 395, no. 133; Крыл. Фл. Алт. V (1909) p. 1206.

Very common on the banks of the Yenisei and Abakan rivers, as well as on the low and humid islets there, where gathered by me flowering in the first half of June, and with ripe capsules in the second half of June. Shape of leaves somewhat varying, colour more or less light grey to whitish on the under side (f. *glaucophylla* Seringe, Essai Monogr. Saul. Suisse (1815) p. 78; *Salix triandra β discolor* Kock, Kryl. l. c.).

Distribution: Europe, except the extreme south, south-western Asia to Turkestan, Siberia, northwards to 66° 20′ north latitude, eastern Asia, Japan.

Salix daphnoides Vill. Hist. Pl. Dauph. III (1789) p. 765; Wimmer, *Salic.* Europ. (1866) p. 4; Вольфъ, Ивы Европ. Россіи I, п. 29; Вольфъ, Ивы Азіат. Россіи I, п. 194; Ledeb. Fl. Ross. III, p. 602 (misprint 502); Herder, Pl. Radd. (1892) p. 423, no. 158; Крыл. Фл. Алт. V (1909) p. 1207. *Salix praecox* Hoppe, Ledeb. Fl. Alt. IV, p. 259. *Salix acutifolia* Willd., Turczan. Fl. Baical.-Dahur. (1854, I) p. 374, no. 1021; Herder, l. c. p. 424.

The specimens collected generally distinguished by their narrowly lanceolate leaves, commonly 5—8 cm. long, and 11—13 mm. broad when full-grown. Leaves very short-petioled, tapering towards the summit into a long and sharp point. Stipules small, ovate. However, according to O. von Seemen (in Aschers. et Graebn. Synops. Mit-

teleur. Fl. IV (1909) p. 167) the main form may also have narrowly lanceolate leaves. Very common on the banks of the Yenisei and Abakan rivers, and on the low, moist islets in those rivers. Gathered with nearly ripe capsules in the middle of June.

var. **rorida** Lackschewitz f.

The specimens collected are characterized by their stalky catkins, to 1 cm. long, thickly hairy stalks, in so far distinguished from the ordinary var. *rorida* as the densely long-haired catkin-scales are entire, and not dentate at the base, which is a chief character in var. *rorida*. My specimens, therefore, possibly ought to be referred to a var. *subpedunculata*. As my material is rather scarce, comprising in all but 4 sheets, probably taken from the same tree, and, besides, I have had no opportunity of comparing with the specimens reported by Lackschewitz, I dare not settle this question definitely. The leaves of these specimens are also somewhat broader than those of the material collected, belonging to the typical form, in other respects agreeing well with each other.

On an islet in the river Abakan, near Askys, on moist banks of rivers. Collected with nearly ripe capsules in the middle of June.

Distribution: Europe, except the extreme north and south, Turkestan, Afghanistan, western Tibet, the Himalayas, Siberia, except the extreme western portions, eastern Asia, Sakhalin, Japan.

Salix viminalis L. Spec. Pl. ed. II (1763) p. 1448; Wimmer, *Salic.* Europ. (1866) p. 36; Вольфъ, Ивы Европ. Россіи I, п. 70; Ledeb. Fl. Alt. IV, p. 265; Turczan. Cat. Baical .no. 1028; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 819?; Ledeb. Fl. Ross. III, p. 605; Turczan. Fl. Baical.-Dahur. (1854, I) p. 378, no. 1027; Herder, Pl. Radd. (1892) p. 425, no. 160; Крыл. Фл. Алт. V (1909) p. 1211. *Salix stipularis* Ledeb. Fl. Ross. III, p. 605.

Specimens appearing to be very near the typical *Salix viminalis*, collected by me on the banks of the Amyl, near Kushabar, and on the Bei-kem, near Tapsa.

subspec. **splendens** (Turczan.) Anderss. in DC. Prodrom. XVI, 2 (1868) p. 265. *Salix splendens* Turczan. Pl. Exsicc. no. 1829. *Salix viminalis* ς Turczan. Fl. Baical.-Dahur. (1854, I) p. 380, no. 1027.

My specimens belonging to this subspecies, gathered in several places on islets in the river Abakan, as well as on the banks of that river, agree perfectly with the specimens from the Altai in Andersson's herbarium, in the botanical collections of the „Riksmuseum" at Stockholm.

subspec. **Gmelini** (Pallas) Anderss. l. c. (1868) p. 266. *Salix Gmelini* Pallas, Fl. Ross. II, p. 153; Ledeb. Fl. Ross. III, p. 606; Turczan. Fl. Baical.-Dahur. (1854, I) p. 381, no. 1029.

f. rufescens (Turczan.) Anderss. l. c.

Occurring together with the preceding one, and seemed to be rather frequent in the regions about the lower parts of the river Abakan. The two said forms of *Salix viminalis* constitute, for a great part, the brush-wood vegetation on the banks of the

rivers Yenisei and Abakan; although numerous intermediate forms are to be found there as well. The species mostly past flowering in the second half of June.

Distribution: *Salix viminalis* is spread over Europe, northwards (in Norway) to 64° 12′ north latitude (planted), Asia Minor, Trans Caucasia, Turkestan, Armenia, Dzungaria, Punjab, the Himalayas, Siberia, in the Yenisei valley northwards to 72° 15′ north latitude, northern Mongolia, eastern Asia, Sakhalin, Japan, North and South America (planted). The two subspecies mentioned, are eastern, mostly Asiatic forms.

Salix triandra L. × **viminalis** L. Enander in litt. f. *filamentis basi pilosis*.

On the margins of an islet in the river Abakan, near Askys. In full flower in the middle of June.

According to ENANDER (in litt.) at least some of the specimens described as S. *viminalis* subspec. *Gmelini* may really be considered as hybrids between *S. triandra* and *S. viminalis*. The forms in question have light, yellowish-brown catkin-scales, and the ripe capsules only slightly shorter than the catkin-scale.

Salix cinerea L. × **viminalis** subspec. *Gmelini* f. *subviminalis* Enander.

In my collections I have 2 sheets of this form, taken on an islet in the Yenisei, near the banks of the river, about half-way between Minusinsk and Ust Abakansk. With half ripe capsules at the beginning of June.

Salix caprea L. Spec. Pl. ed. II (1763) p. 1448; Wimmer, *Salic.* Europ. (1866) p. 55; Anderss. Monogr. *Salic.* I (1867) p. 75, no. 45; Вольфъ, Ивы Европ. Россіи II, п. 66; Ledeb. Fl. Alt. IV, p. 268 (excl. syn. *Salix phlomoides* Marsch.-Bieb.) Turczan. Cat. Baical. no. 1031; Ledeb. Fl. Ross. III, p. 609; Turcan. Fl. Baical.-Dahur. (1854, I) p. 383, no. 1032; Herder, Pl. Radd. (1892) p. 402, no. 138; Крыл. Фл. Алт. V (1909) p. 1215.

Scattered in thickets, and the like, along brooks in several places between Kushabar and Minusinsk, near Ust Algiac, on the Dora Steppe, on the Upper Bei-kem.

Distribution: Europe, northwards to 69° 40′ north latitude, the Caucasus, Asia Minor, Persia, Russian Turkestan, Siberia, in the Yenisei valley northwards to 69° north latitude, northern Mongolia, eastern Asia, Sakhalin, Japan.

Salix arbuscula L. Spec. Pl. ed. II (1763) p. 1445; Wimmer, *Salic.* Europ. (1866) p. 102; Anderss. Monogr. *Salic.* I (1867) p. 145, no. 80; Ledeb. Fl. Ross. III, p. 622; Turczan. Fl. Baical.-Dahur. (1854, I) p. 392, no. 1048; Вольфъ, Ивы Европ. Россіи II, п. 91; Herder, Pl. Radd. (1892) p. 417, no. 150; Крыл. Фл. Алт. V (1909) p. 1216. *Salix prunifolia* Ledeb. Fl. Alt. IV, p. 286; Turczan. Cat. Baical. no. 1048.

In the Altaian, above the limit of tree vegetation, near a mountain brooklet. With ripe, and nearly ripe capsules at the end of July.

Distribution: Arctic and alpine regions of Europe, Caucasia, Russian Turkestan, the Thian Shan, Siberia, in the Yenisei valley to 72° north latitude, northern Mongolia (Sayansk district), eastern Asia (southwards to the north of China), North America, Greenland.

Salix phyllicifolia L. Spec. Pl. ed. II (1763) p. 1442; Anderss. Monogr. *Salic.* I (1867) p. 131, no. 70; Ledeb. Fl. Ross. III, p. 611; Herder, Pl. Radd. (1892) p. 414, no. 145 b. *Salix arbuscula β phyllicifolia* Вольфъ, Ивы Европ. Россіи II, п. 91; Крыл. Фл. Алт. V (1909) p. 1217.

Scattered in subalpine wood regions about the Upper Amyl, near Semiretska, and here and there in moist places along rivers, between the Algiac Pass and Ust Algiac. With ripe capsules in the second half of June. The leaves of the specimens gathered, are narrow, lanceolate, margin entire or slightly serrulate, light greyish green underneath, completely smooth all over. Capsules reddish brown, finely and slightly hairy (var. *angustifolia* Anderss. Monogr. *Salic.* I (1867) p. 133 f. *liocarpa* Aschers. et Graebn. Synops. Mitteleur. Fl. IV (1909) p. 144).

Distribution: Northern and middle Europe, northwards to 71° north latitude, France and the Pyrenees, Siberia, eastern Asia.

Salix livida Wahlenb. Fl. Lappon. (1812) p. 273; Wimmer, *Salic.* Europ. (1866) p. 108; Вольфъ, Ивы Европ. Россіи II, п. 85. *Salix vagans* 3 *livida* Anderss. Monogr. *Salic.* I (1867) p. 90. *Salix depressa* var. *livida* Ledeb. Fl. Ross. III, p. 611. *Salix Starkeana* Willd., Ledeb. Fl. Alt. IV, p. 274; Turczan. Cat. Baical. no. 1032. *Salix depressa* L., Turczan. Fl. Baical.-Dahur. (1854, I) p. 383, no. 1033; Крыл. Фл. Алт. V (1909) p. 1217.

subspec. **cinerascens** Wimmer var. *occidentalis* Wimmer, l. c. *Salix vagans* Anderss., Herder, Pl. Radd. (1892) p. 404, no. 139.

Rather common in regions about the river Abakan, between Askys and Ust Kamuishto, where occurring in somewhat moist places, in the islets and on the river-banks. Gathered flowering and with young capsules in the middle of June, and with quite ripe fruits at the end of June, in the Urjankai country, near Ust Tara-kem. The specimens gathered, from various localities, vary somewhat in the breadth of the leaves.

Distribution: The species is distributed over northern and middle Europe, Turkestan, Siberia, northwards to 66° north latitude, northern Mongolia, eastern Asia. The above subspecies in the more eastern portions of Siberia.

Salix hastata L. Spec. Pl. ed. II (1763) p. 1443; Wimmer, *Salic.* Europ. (1866) p. 83; Anderss. Monogr. *Salic.* I (1867) p. 170; Вольфъ, Ивы Европ. Россіи II, p. 102; Ledeb. Fl. Alt. IV, p. 272; Turczan. Cat. Baical. no. 1037; Ledeb. Fl. Ross. III, p. 612; Turczan. Fl. Baical.-Dahur. (1854, I) p. 384, no. 1035; Herder, Pl. Radd. (1892) p. 421, no. 157; Крыл. Фл. Алт. V (1909) p. 1220.

subspec. **subalpina** Anderss. l. c. p. 172; Крыл. l. c. p. 1220.

In the Altaian, in moist places, up to the perennial snow. With nearly ripe fruits at the end of July.

Distribution: The species is distributed over northern and middle Europe as well as the Peninsula, Russian Turkestan, Tibet and the Himalayas, to Sikkim, Siberia, northwards to 70° 10′ north latitude, northern Mongolia, Sakhalin.

Salix glauca L. Spec. Pl. ed. II (1763) p. 1446; Wimmer, *Salic.* Europ. (1866) p. 91; Ledeb. Fl. Alt. IV, p. 280; Turczan. Cat. Baical. no. 1044; Ledeb. Fl. Ross. III, p. 618; Turczan. Fl. Baical.-Dahur. (1854, I) p. 390, no. 1044; Herder, Pl. Radd. (1892) p. 435, no. 166; Вольфъ, Ивы Европ. Россіи II, p. 24; Крыл. Фл. Алт. V (1909) p. 1227. *Salix macrocarpa* Ledeb. in Trautv. *Salic.* Frig. No. 5—Nouv. Mem. Soc. Imp. Nat. Moscou II (1832) p. 292.

f. vel modific. foliis vix conspicue et parcissime serrulatis, quae differentia e contagione dependeat.

Especially on moist and cool mountain slopes with a northern aspect, above the limit of tree vegetation, at altitudes of about 18—2000 m. above sea-level. Taken with nearly ripe fruits at the end of July.

Distribution: Arctic and alpine Europe, southwards on the mountains to northern Italy, Novaya Zemlya, arctic Siberia from about 65° north latitude to the Arctic Ocean, eastwards to Kamtchatka, and on the islands towards North America, the Altai, and the Sayansk district, the Yablonoi mountains, North America, Greenland.

Salix myrsinites L. Spec. Pl. ed. II (1763) p. 1445; Wimmer, *Salic.* Europ. (1866) p. 97; Ledeb. Fl. Alt. IV, p. 284; Ledeb. Fl. Ross. III, p. 620; Turczan. Fl. Baical.-Dahur. (1854, I) p. 390, no. 1045; Herder, Pl. Radd. (1892) p. 441, no. 170; Вольфъ, Ивы Европ. Россіи II, p. 108; Крыл. Фл. Алт. V (1909) p. 1230.

On moist mountain sides, on rocky slopes in the Altaian, above the limit of tree vegetation. With half ripe capsules at the end of July.

Distribution: Arctic and alpine regions of Europe, Novaya Zemlya, arctic Siberia to Kamtchatka, the Altai, the Sayansk district, Baikal and Trans Baikal, arctic America, Greenland.

Salix Turczaninowii Lackschewitz in litt. *Salix herbacea* L. in previous authors mentioning the Siberian *Salices.* [Tab. III, Fig. 3, 4].

Stigmatibus 0,4-0,5 mm. longis, sat crassis, bifidis, plus minus divaricatis vel coalitis, subrubentibus; stylis 0,2-0,3 mm. longis; capsulis 2×0,8 mm. vel 4×2 mm. (maturis) rubidis; pedicellis 0,8-0,5 longis, glaberrimis et rubidis; nectariis internis tantum ca. 0,8-0,4 mm., integris; squamis 1,5×0,8—1,8×1,7 mm., lingulatis - subrotundatis, rubidis (vel inferioribus pallidioribus) glaberrimis, pilis 0,5-0,8 mm. longis ciliatis, interdum squamis superioribus fere omnio glaberrimis; amentis 15×4—20×5 vel 30×6(7) mm., capsulis ca. 14-22 instructis; pedunculis ca. 10 mm. longis densius pubescentibus-subtomentosis, basi foliis 1-2, 20×14—28×16 mm., subovatibus foliis ordinariis ceterum similibus instructis; foliis ordinariis infimis 10×6 mm. ovalibus, foliis intermediis 25×10—28×12(16) mm. ovalibus vel majoribus plus minus obovatis, fere concoleribus utrinque glaberrimis; supra nervis admodum elevatis, serratis, dentibus 1-3 mm. inter se remotis; petiolis 2-4 mm. longis, glaberrimis; stipulis nullis; gemmis et ramulis novellis glaberrimis.

A Salix herbacea L. *differt imprimis amentis longioribus, angustioribus; foliis plus minus ovalibus (etsi uno alterore folio apice paullulum retuso).*

According to LACKSCHEWITZ (in litt.), *Salix herbacea* L. does not occur in Siberia, where replaced by *Salix Turczaninowii*, a species nearly allied to it. Though very near *Salix herbacea* L., the former is distinguished by its longer and narrower pistillate catkins, 15—30 mm. long, and 4—7 mm. broad. The catkins bear numerous capsules, from 14 to 22 in number, more or less approximate, the nethermost, however, during the fruit formation, rather far apart. The leaves are ovate, rather stretched in length, the length to twice the breadth, broadest about the middle, and tapering both towards the summit and the base. The base more or less acute, generally not blunt or cordate, the summit more or less subobtuse or slightly acuminate, rarely slightly incised.

This species gathered by me in open, sunny, not unfrequently somewhat moist places, above the limit of tree vegetation, in the Altaian. Past flowering and with nearly ripe capsules at the end of July.

Distribution: Siberia, northern Mongolia. The range of the species is, for the rest, as yet unknown.

Salix myrsinites L. × **Turczaninowii** Lacksch. f. **medians** nov. f. s. f. **Printzii** Enander s. f. nov. [Tab. VII, Fig. 2].

Stigmatibus 0,4-0,5 mm. longis, bifidis; stylis 0,6-0,8 mm. longis; capsulis maturis 3-4×2 mm., glaberrimis basique ipsa hirtula; pedicellis 0,3 mm. longis, breviter tomentosis; nectariis internis tantum 0,2-0,3 mm. integris, subrubidis vel rufescentibus; squamis 2×1,5 vel 1,5×1 mm. sublingulatis - subrotundis, atropurpureis, pilis 1-1,5 mm. longis, sat rectis villosis; amentis subdefloratis 28×15 mm.; pedunculis 10 mm. longis, pilosis, foliis 4, 10×5—12×7 mm. gemmiferis exstipulatis, ovali-lanceolatis, glaberrimis serratis instructis; foliis ordinariis infimis 10×5 mm., ovalibus, subtus pilosis, foliis intermediis 17×9—24×13 mm. plus minus obovatis, concoloribus, glaberrimis, serratis (dentibus circa 1 mm. inter se remotis) apiceque ipso plus minus integro, supra nervis admodum tenuibus, sat elevatis, vix conspicue, tenuiter punctatis, nitidis, subtus item sed paullulum opacis; petiolis 2-3 mm. longis, glaberrimis; stipulis 2×1 mm., sabovatis, serratis vel minimis vel nullis; gemmis ad 4×2,5 mm. usque, glaberrimis; ramulis novellis plus minus pillosis; (ramis plus minus flabellatis adpressis - adscendentibus?).

A. S. myrsinite differt capsulis fere omnino glaberrimis; foliis supra medium vulgo latissimis, quibus notis ad S. Turczaninowiam vergit.

Collected in the Altaian, where occurring together with the preceding one. With ripe capsules at the end of July.

Distribution: Sayansk district (northern Mongolia).

Salix reticulata L. Spec. Pl. ed. II (1763) p. 1446; Wimmer, *Salic.* Europ. (1866) p. 129; Ledeb. Fl. Alt. IV, p. 291; Turczan. Cat. Baical. no. 1052; Ledeb. Fl. Ross. III, p. 623; Turczan. Fl. Baical.-Dahur. (1854, I) p. 395, no. 1050; Herder, Pl. Radd. (1892) p. 450, no. 180; Вольфъ, Ивы Европ. Россіи II, p. 114; Крым. Фл. Алг. V (1909) p. 1232.

In moist places, among lichens and mosses, and the like, above the limit of tree vegetation, in the Altaian. With nearly ripe fruits at the end of July.

Distribution: Arctic and alpine regions of Europe, (southwards to the Pyrenees, Alps, Carpathian mountains), Iceland, Spitzbergen, Novaya Zemlya, arctic Siberia, between about 67½°—73½° north latitude (Dickson Harbour), and eastwards to Kamtchatka, the Altai, the Sayansk district, Baikal and Trans Baikal mountains, northern Mongolia, arctic America, Greenland.

Salix pyrolaefolia Ledeb. Fl. Alt. IV, p. 270; Turczan. Cat. Baical. no. 1036; Ledeb. Fl. Ross. III, p. 613; Anderss. Monogr. *Salic.* I (1867) p. 169, no. 101; Turczan. Fl. Baical.-Dahur. (1854, I) p. 385, no. 1036; Вольфъ, Ивы Европ. Россіи II, p. 106; Крыл. Фл. Алт. V (1909) p. 1221.

In moist meadows, near the banks of the Upper Sisti-kem.

Distribution: Northern Russia, Siberia, northern Mongolia.

Salix cinerea L. Spec. Pl. ed. II (1763) p. 1449; Wimmer, *Salic.* Europ. p. 47; Anderss. Monogr. *Salic.* I (1867) p. 71, no. 44; Ledeb. Fl. Ross. III, p. 607; Herder, Pl. Radd. (1892) p. 400, no. 137; Вольфъ, Ивы Европ. Россіи II, p. 72; Крыл. Фл. Алт. V (1909) p. 1213.

In moist meadows, on an islet in the river Abakan, near Ust Kamuishto. With nearly ripe capsules in the second half of June.

Distribution: Europe, the Caucasus, Asia Minor, Persia, Russian Turkestan, through Siberia and middle Asia to Kamtchatka, eastern Asia and northern Corea, Sakhalin, North Africa.

Salix fragilis L. Spec. Pl. ed. II (1763) p. 1443; Wimmer, *Salic.* Europ. (1866) p. 19; Anderss. Monogr. *Salic.* I (1867) p. 41, no. 28; Ledeb. Fl. Ross. III, p. 598.

Some specimens of this one observed by me in the Amyl valley, near Kushabar.

Distribution: Europe, south-western Asia, western and middle Siberia, eastwards about to the Baikal, America (introduced).

Betula rotundifolia Spach, Rev. *Betulac.* in Ann. Sc. Nat. Ser. II (1841) p. 194; Сукачевъ, Къ Сист. Сиб. Березъ—въ Труд. Бот. Муз. Акад. Наукъ (1911) p. 215. *Betula glandulosa* Michx. Fl. Bor. Amer. II (1803) p. 180; Herder, Pl. Radd. (1892) p. 64; Winkler, *Betulac.* in Engl. Pflanzenr. H. 19 (IV, 61, 1904) p. 73. *Betula nana* in Ledeb. Fl. Alt. IV, p. 246; Turczan. Cat. Baical. no. 1062; Turczan. Fl. Baical.-Dahur. (1854, I) p. 403, no. 1061; Крыл. Фл. Алт. V (1909) p. 1250. *Betula nana β sibirica* Ledeb. Fl. Ross. III, p. 654. *Betula nana β sibirica* et *γ intermedia* Regel, Monogr. *Betulac.* (1861) p. 43, 44.

Common in the Sayansk district, in subalpine and alpine regions, up to about 2000 m. above sea-level, in moist as well as in drier situations. It appears from the material collected that the species varies considerably in the form and size of the leaves, from 1 to 2 cm. in diameter, as well as in the shape of the teeth. The form of pistillate catkins varies between ovoid and subcylindrical. Collected with nearly ripe fruits at the end of August.

Distribution: From the Altai eastwards, through Siberia and northern Mongolia to Kamtchatka and the Tshuktsher Peninsula, Sakhalin, North America, Greenland to 63° north latitude.

Betula humilis Schrank, Bayersche Fl. (1789) p. 421; Winkler, *Betulac.* in Engl. Pflanzenr. H. 19 (IV, 61, 1904) p. 73; Ledeb. Fl. Ross. III, p. 653; Regel, Monogr. *Betulac.* (1861) p. 104 ex parte; Herder, Pl. Radd. (1892) p. 65; Крыл. Фл. Алт. V (1909) p. 1249; Сукачевъ, Къ Сист. Сиб. Березъ (1911) p. 208. *Betula fruticosa* Pallas, Fl. Ross. I (1784) p. 62; Ledeb. Fl. Alt. IV, p. 246; Spach, Rev. *Betulac.* (1841) p. 193. Turczan. Fl. Baical.-Dahur. (1854, I) p. 403, no. 1060 ex parte.

At Uibat, near the river Abakan; rather common in subalpine regions in the Urjankai country, especially in swampy and peaty situations, and the like; frequent between Kalna and Ust Algiac, and in peat-bogs in the Altaian. The pedicels comparatively long, up to 12 mm. Taken with nearly ripe fruits in the second half of June.

Distribution: Middle Europe, Russia, temperate portions of Asia, northwards to 65° 50′ north latitude.

Betula verrucosa Ehrh. Beitr. Naturk. VI (1791) p. 98; Winkler, *Betulac.* in Engl. Pflanzenr. H. 19 (IV, 61, 1904) p. 75. *Betula alba* L. Spec. Pl. ed. II (1763) p. 1393 ex parte; Ledeb. Fl. Alt. IV, p. 244; Ledeb. Fl. Ross. III, p. 650; Turczan. Fl. Baical.-Dahur. (1854, I) p. 400, no. 1056. *Betula alba* L. *α vulgaris* et *γ verrucosa* Regel, Monogr. *Betulac.* (1861) p. 17, 19; Herder, Pl. Radd. (1892) p. 48, no. 201; Крыл. Фл. Алт. V (1909) p. 1247.

Common in the lower regions of southern Siberia and the Urjankai country, along the Bei-kem. Gathered with fruits in July.

Distribution: According to Winkler, l. c., the species is distributed over Europe, Asia Minor, the Caucasus, Siberia, and northern Mongolia, northwards to about 50° north latitude, eastern Asia, Japan.

Betula pubescens Ehrh. Beitr. Naturk. VI (1791) p. 98; Ledeb. Fl. Ross. III, p. 651; Winkler, *Betulac.* in Engl. Pflanzenr. H. 19 (IV, 61, 1904) p. 81. *Betula alba* L. *ς pubescens* Regel, Monogr. *Betulac.* (1861) p. 24; Herder, Pl. Radd. (1892) p. 52; Крыл. Фл. Алт. V (1909) p. 1247.

subspec. **ovalifolia** (Schneid.) Sukacz. in herb. (1916). *Betula ovalifolia* Rupr. in Maak, Erst. Bot. Nachr. Amurl. II (1857) p. 560; Сукачевъ, Къ Сист. Сиб. Березъ (1911) p. 210. *Betula fruticosa* Pall. *β Ruprechtiana* Trautv., Winkler l. c. (1904) p. 87. *Betula humilis ε Ruprechtii, ζ reticulata, η ovalifolia* Regel, l. c. (1861) p. 51—52.

Common in the Altaian, frequently in somewhat moist places, in subalpine regions, to above the limit of conifers, where collected by me with ripe fruits at the end of July.

Distribution: Eastern Siberia, northern Mongolia, Manchooria.

subspec. **rhombifolia** (Regel) Sukacz. in herb. (1916). *Betula alba* subspecies *pubescens* ε *rhombifolia* Regel in DC. Prodrom. XVI, 2 (1868) p. 167; Herder, Pl. Radd. (1892) p. 53.

Specimens of this one taken by me, with nearly ripe fruits, in the middle of July, in the subalpine wood regions between Kalna and Ust Algiac, where, in places, rather common. Occurring, moreover, rather frequently in the Urjankai country.

Distribution: Eastern Europe, Siberia, northern Mongolia.

Alnus fruticosa Rupr. Fl. Samojed. Cisur. (1845) no. 249; Крыл. Фл. Алт. V (1909) p. 1252. *Alnaster fruticosus* Ledeb. Fl. Ross. III, p. 655. *Alnus alnobetula* (Ehrh.) Hartig var. *frùticosa* (Rupr.) Winkler, *Betulac.* in Engl. Pflanzenr. H. 19 (IV, 61, 1904) p. 106. *Alnaster viridis* Turczan. Fl. Baical.-Dahur. (1854, II) p. 404, no. 1062. *Betula viridis* Turczan. Cat. Baical. no. 1059. *Alnus viridis* var. *sibirica* Regel, Monogr. *Betulac.* (1861) p. 79 Herder, Pl. Radd. (1892) p. 69.

Scattered in the Amyl valley and between Kalna and Ust Algiac, especially along river-banks, where gathered by me in flower about the middle of July. Rather frequent in the Urjankai country; on the rivers Sisti-kem, Bei-kem, Kamsara, and Tara-kem. In the Altaian, on the mountains, it ascends to 16—1700 m. above sea-level.

Distribution: North-eastern Russia, Siberia, northwards to about 72½° north latitude, northern Mongolia, eastern Asia, Sakhalin, Japan, North America.

subspec. **montana** *nov. subspec.* [Tab. VII, Fig. 1].

A forma typica humilitate differens, 1-1,5 mm. alta, foliis parvulis, 2-3,5 cm. longis, 1,3-2 cm. latis, ovatis vel oblonge ovatis, acuminatis, basi rotundatis, vel leviter cordatis, distincte duplicato-serratis, dentibus densis, tenuibus, acutis. Folia glaberrima, subtus dilute viridia, et nervus medius - sicut axillae nervorum - semper omnino glaber, nunquam barbulatus, sed fere plus minus glandulosus. Petioli 0,2 cm. longi, subtomentosi et glandulosi. Inflorescentia fructiferae tempore florescendi parvae, ovoideae vel subglobosae, 4-8 mm. fere 5-6 mm. longae 3,5-6, fere 4 mm. latae. Pedunculi 0,5-1 cm. longi, dense puberuli et glandulosi. Squamae fructiferae 1,5-2 mm. longae, nuculae stigmatibus longioribus, circa 2 mm. longis, nuculas aequantibus. Nucula ala membranacea cincta.

This subspecies, found by me in the Altaian, about the limit of tree vegetation, is distinguished by being a low shrub, not exceeding a man's height, with much curved branches, and short, smooth year's shoots, only a few cm. long. The leaves are small, ovate, pointed at the summit, and at the base broadly rounded or slightly cordate, length from 2,5 to 3 cm., and breadth towards 2 cm. The leaves are always markedly incised-serrulate, with fine, acute teeth and are, moreover, distinguished by the midrib being completely smooth underneath and by the absence of tufts of hairs in the angles between the veins on the under sides of the leaves, which are, like the petioles, peduncles, and the year's shoot on the whole, more or less densely glandular-hairy. The leaves are always of a pale green and dull colour underneath, bright and glabrous above. Female catkins small, only half the sixe of those of the typical species, generally from

5—6 mm. long, and 4 mm. broad, broadly ovoid to nearly globular, and each female flower correspondingly smaller, stigmas long and projecting, about the same length as the flowers, thus, at any rate to judge from my material, comparatively longer than in the typical species. Catkin-scales about 2 mm. long, narrow below, only above the middle rather suddenly dilated in a fan-shape. The wing of the nut seems to be comparatively narrower than in the typical form.

This form collected by me along mountain brooks, and in moist places in the Altaian, accompanying various species of *Salix* about the limit of tree vegetation, or even somewhat higher than the limit of conifers. When gathered at the end of July, in part done flowering, and with young fruits.

Cannabaceae ENGL.

Cannabis sativa L. Spec. Pl. ed. II (1763) p. 1457; Ledeb. Fl. Alt. IV, p. 294; Turczan. Cat. Baical. no. 1011; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 817; Ledeb. Fl. Ross. III, p. 634; Turczan. Fl. Baical.-Dahur. (1854, II) p. 367, no. 1015; Herder, Pl. Radd. (1892) p. 33, no. 191; Крыл. Фл. Алт. V (1909) p. 1240.

Occurring scattered along borders of corn-fields, by road-sides, and near settlements, here and there as weeds, on the Abakan Steppe, and in several places along the road between Minusinsk and Ust Abakansk, where it begins flowering at the end of June.

Distribution: A native of middle and south-western Asia and adjoining portions of Europe. Now in cultivation, or having established itself as an escape from cultivation over the greater part of temperate regions.

Humulus lupulus L. Spec. Pl. ed. II (1763) p. 1457; Ledeb. Fl. Alt. IV, p. 294; Ledeb. Fl. Ross. III, p. 635; Herder, Pl. Radd. (1892) p. 35, no. 192; Крыл. Фл. Алт. V (1909) p. 1241.

Dispersed in thickets on the islets in the rivers Yenisei and Abakan, and along the river-banks. Specimens gathered in June, about 1 m. long, as yet sterile. In thickets, near Kushabar, and scattered in the taiga about the river Amyl.

Distribution: Europe, except the extreme north, northern and middle Asia, except the arctic regions, North America (introduced).

Urticaceae JUSS.

Urtica urens L. Spec. Pl. ed. II (1763) p. 1396; Ledeb. Fl. Alt. IV, p. 241; Turczan. Cat. Baical. no. 1008; Ledeb. Fl. Ross. III, p. 636; Turczan. Fl. Baical.-Dahur. (1854, II) p. 364, no. 1012; Herder, Pl. Radd. (1892) p. 37, no. 194; Крыл. Фл. Алт. V (1909) p. 1242.

On the Abakan Steppe, near habitations at Minusinsk, Karatus, Kushabar, and Ust Algiac.

Distribution: Europe, the Caucasus, Asia Minor and western Asia, Siberia, northwards to about 66½° north latitude, northern China, North Africa, and introduced into America and Australia.

Urtica dioica L. Spec. Pl. ed. II (1763) p. 1396; Ledeb. Fl. Alt. IV, p. 240; Turczan. Cat. Baical. no. 1007; Ledeb. Fl. Ross. III, p. 637; Turczan. Fl. Baical.-Dahur. (1854, II) p. 363, no. 1011; Herder, Pl. Radd. (1892) p. 39, no. 195; Крыл. Фл. Алт. V (1909) p. 1243.

At Minusinsk and Kushabar, in subalpine wood regions about the Upper Amyl, especially near habitations (Petropawlowsk, Kalna, and other places), Ust Algiac, Ust Sisti-kem, near the Dora Steppe, Tapsa, etc.

Distribution: Europe, except the arctic regions, south-western, central and northern Asia (northwards to about 68½° north latitude), eastern Asia, Sakhalin, Japan, North Africa, North and South America, Australia (introduced).

Urtica cannabina L. Hort. Upsal. (1748) p. 282 et Spec. Pl. ed. II (1763) p. 1396; Ledeb. Fl. Alt. IV, p. 241; Turczan. Cat. Baical. no. 1009; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 816; Ledeb. Fl. Ross. III, p. 638; Turczan. Fl. Baical.-Dahur. (1854, II) p. 364, no. 1013; Herder, Pl. Radd. (1892) p. 42, no. 196; Крыл. Фл. Алт. V (1909) p. 1244.

In dry meadows on the Abakan Steppe, and near habitations, such as Askys, Ust Kamuishto and Ust Abakansk, and scattered on the steppes near the Bei-kem and Ulukem, from the Tapsa, westwards towards Cha-kul.

Distribution: From the Ural, through Siberia to Trans Baikal and Kamtchatka, northern Persia, Russian Turkestan, northern Mongolia, Manchooria, China.

Santalaceae R. Br.

Thesium refractum C. A. Meyer in Bull. Acad. St. Petersbourg VII, p. 340; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 804; Ledeb. Fl. Ross. III, p. 539; Herder, Pl. Radd. (1892) p. 342, no. 103. *Thesium ramosum* Ledeb. Fl. Alt. I, p. 275 (excl. synon. praeter Patrin); Bunge, Enum. Alt. p. 14. *Thesium pratense* Ehrh., Turczan. Fl. Baical.-Dahur. (1852, IV) p. 470, no. 1002; Крыл. Фл. Алт. V (1909) p. 1173. *Thesium saxatile* Turczan. Cat. Baical. no. 1001.

Rather common in dry, grass-grown places on the Abakan Steppe, near Askys and Ust Kamuishto. Collected by me in dry, sandy places, among loose stones, on sunny slopes, and the like, on the islets in the river Abakan. Taken with flowers and with fruits in June. On the Ulu-kem, near Bjelosarsk, past flowering at the end of August. The specimens collected are quite glabrous, *α typica* Krylow, l. c.

Distribution: South-eastern Russia, Russian Turkestan, the Thian Shan, Siberia, eastwards to Trans Baikal, northern Mongolia.

Polygonaceae JUSS.

Koenigia islandica L. Mant. I (1767) p. 35; Ledeb. Fl. Alt. I, p. 124; Turczan. Cat. Baical. no. 992; Ledeb. Fl. Ross. III, p. 535; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 462, no. 993; Herder, Pl. Radd. (1892) p. 212, no. 69; Крыл. Фл. Алт. V (1909) p. 1171.

In moist, grass-grown places, near a mountain brooklet in the Altaian, at an altitude of about 1900 m. above sea-level. Flowering at the end of July.

Distribution: Arctic regions of Europe (Iceland, the Faroe Islands, Spitzbergen, Jan Mayen, Beeren Eiland, Novaya Zemlya, Norway, northern Sweden, northern Russia), northern Siberia (in the Yenisei valley, northwards past 70° north latitude), the Altai, the Sayansk district, the Himalayas, North America, Greenland, Tierra del Fuego (DUSÉN, SKOTTSBERG).

Polygonum aviculare L. Spec. Pl. ed. II (1762) p. 519; Lindman in Svensk Botan. Tidsskrift VI (1912) p. 673; Ledeb. Fl. Alt. II, p. 85; Turczan. Cat. Baical. no. 977; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 790; Ledeb. Fl. Ross. III, p. 531; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 461, no. 992; Herder, Pl. Radd. (1892) p. 214, no. 72; Meisner, Monogr. Gen. *Polyg.* p. 87, no. 95; Крыл. Фл. Алт. V (1909) p. 1169.

Very common in the territory explored, along road-sides, near habitations, in courtyards, in moist places about the river Abakan, Minusinsk, Karatus, Kushabar, in farmyards, and the like, of settlements in the taiga, at Ust Algiac, Ust Sisti-kem, the Kamsara, Tara-kem, Cha-kul and Ust Uss. The species varies considerably. The following forms appear to be common from the structure of the vegetative shoots: *α procumbens* HAYNE, LEDEB. l. c., *β erectum* LEDEB. l. c., and *δ vegetum* LEDEB. l. c. However, as ripe fruits are wanting in the specimens collected, an exact determination of this material is at present hardly possible.

Distribution: Nearly all over the globe.

Polygonum dumetorum L. Spec. Pl. ed. II (1762) p. 522; Ledeb. Fl. Alt. II, p. 82; Turczan. Cat. Baical. no. 970; Ledeb. Fl. Ross. III, p. 528; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 457, no. 984; Meisner, Monogr. Gen. *Polyg.* p. 63, no. 32; Herder, Pl. Radd. (1892) p. 258, no. 92; Крыл. Фл. Алт. V (1909) p. 1169.

On slopes and in open woods of foliferous trees, near Kushabar. In full flower in the middle of July.

Distribution: Europe, south-western Asia to Turkestan, Afghanistan, the western Himalayas, the East Indies, Siberia, eastern Asia, Sakahalin, North America (introduced?).

Polygonum Convolvulus L. Spec. Pl. ed. II (1762) p. 522; Ledeb. Fl. Alt. II, p. 81; Turczan. Cat. Baical. no. 969; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 785; Ledeb. Fl. Ross. III, p. 528; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 456, no. 983; Meisner, Monogr. Gen. *Polyg.* p. 63, no. 30; Herder, Pl. Radd. (1892) p. 255, no. 91; Meisner, *Polyg.* Haute-Asie p. 349 (16); Крыл. Фл. Алт. V (1909) p. 1168.

Rather common as a weed along roads and on margins of corn-fields, between Minusinsk and Kushabar, as well as on the banks of the Bei-kem, near Sebi. With flowers in July.

Distribution: Europe, except the arctic regions, the Caucasus, south-western Asia to Turkestan, Afghanistan, the Himalayas, India, Siberia (in the Yenisei valley northwards to about 61½° north latitude), eastwards to Trans Baikal and the Sea of Okhotsk, Sakhalin, Japan, North Africa, North America (introduced).

Polygonum undulatum Murray, Comment. Goett. V (1774) p. 34. *Polygonum alpinum* Allioni, Fl. Pedemont. II (1785) p. 206; Крыл. Фл. Алт. V (1909) p. 1167. *Polygonum polymorphum* Ledeb. Fl. Ross. III, p. 524 ex parte; Herder, Pl. Radd. (1892) p. 263, no. 98; Meisner, Monogr. Gen. *Polyg.* p. 56, no. 14; Meisner, *Polyg.* Haute-Asie p. 351 (18).

subspec. **alpinum** (Allioni) Beck in Reichenb. Icon. XXIV (1906) p. 86. *Polygonum alpinum* Allioni, Ledeb. Fl. Alt. II, p. 79 pro parte; Turczan. Cat. Baical. no. 972. *Polygonum polymorphum γ alpinum* Ledeb. Fl. Ross. III, p. 524. *Polygonum alpinum α vulgare* Turczan. Fl. Baical.-Dahur. (1852, IV) p. 452, no. 978.

Very common in somewhat moist meadows on the islets in the river Abakan, where collected by me with young flowers in the second half of June. Also common in the Urjankai country, in meadows, and here and there in quite dry places, in open woods of conifers or foliferous trees, where, in places, occurring abundantly, Ust Algiac, Ust Sisti-kem; very common between the Kamsara and the Tara-kem, in woods of spruce, larch and birch intermingled, where found by me, past flowering and nearly withered, in the second half of August.

subspec. **ciliatum** (Willd.) Aschers. et Graebn. Synops. Mitteleur. Fl. IV (1913) p. 842. *Polygonum polymorphum δ undulatum* Ledeb. Fl. Ross. III, p. 525; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 453, no. 978. *Polygonum alpinum* Ledeb. Fl. Alt. II, p. 79 pro parte.

Apparently occurring much more rarely than the preceding one. In my collection is one specimen of it, taken near Ust Abakansk, towards the end of June.

Distribution: Southern Europe, from the Alps southwards, the Caucasus, Asia Minor, Trans Caucasia, Turkestan, Afghanistan, the Himalayas, Siberia, northwards to about 71° north latitude, and eastwards to Trans Baikal, northern Mongolia, North America.

Polygonum minus Huds. Fl. Angl. I (1762) p. 148; Ledeb. Fl. Alt. II, p. 83; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 788; Ledeb. Fl. Ross. III, p. 523; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 459, no. 988; Meisner, *Polyg.* Haute-Asie p. 344 (11); Herder, Pl. Radd. (1892) p. 226, no. 79; Крыл. Фл. Алт. V (1909) p. 1166.

On islets in the Yenisei, in moist, sandy and muddy places, near the banks of the river. With young flower-buds at the end of June.

Distribution: Europe, Caucasia, Trans Caucàsia, the Himalayas, India, Ceylon, Siberia, eastern Asia, South America, Australia.

Polygonum hydropiper L. Spec. Pl. ed. II (1762) p. 517; Ledeb. Fl. Alt. II, p. 84; Turczan. Cat. Baical. no. 981; Ledeb. Fl. Ross. III, p. 523; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 460, no. 990; Herder, Pl. Radd. (1892) p. 224, no. 78; Meisner, Monogr. Gen. *Polyg.* p. 76; Крыл. Фл. Алт. V (1909) p. 1165.

On moist banks on the river Abakan, near Ust Abakansk. With young flower-buds in the middle of June.

Distribution: Europe, except the arctic regions, the Caucasus, south-western Asia to Turkestan and the Himalayas, Siberia, eastern Asia, Sakhalin, Japan, India, Java, North Africa, North America, Australia.

Polygonum tomentosum Schrank, Baier. Fl. I (1789) p. 669. *Polygonum lapathifolium* L., Ledeb. Fl. Alt. II, p. 83; Turczan. Cat. Baical. no. 980; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 787; Ledeb. Fl. Ross. III, p. 321; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 458, no. 987; Meisner, Monogr. Gen. *Polyg.* p. 69, no. 41; Meisner, *Polyg.* Haute-Asie p. 345 (12); Herder, Pl. Radd. (1892) p. 236, no. 83; Крыл. Фл. Алт. V (1909) p. 1163.

As weeds in fields and moist meadows, here and there between Minusinsk and Kushabar, as well as on sandy river-banks on the river Abakan, near Ust Abakansk. With young flowers at the end of June.

Distribution: Europe, Caucasia, and south-western Asia to Turkestan and the Himalayas, Siberia (in the Yenisei valley, northwards to 70° 20′ north latitude), northern Mongolia, eastern Asia, Sakahalin, Japan, India, North Africa, North and South America (introduced), Australia (introduced).

Polygonum amphibium L. Spec. Pl. ed. II (1762) p. 517; Ledeb. Fl. Alt. II, p. 82; Turczan. Cat. Baical. no. 982; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 786; Ledeb. Fl. Ross. III, p. 520; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 458, no. 986; Meisner, Monogr. Gen. *Polyg.* p. 67, no. 39; Meisner, *Polyg.* Haute-Asie p. 344 (11); Herder, Pl. Radd. (1892) p. 228, no. 80; Крыл. Фл. Алт. V (1909) p. 1162.

Rather common in the territory explored, where — in point of habitats — noted as f. *aquaticum* Leyss. (Fl. Hal. (1761) p. 391) and f. *terestre* Leyss. (l. c. p. 391). The leaves of the latter form bear rather stiff, straight hairs, never glandular in the specimens gathered. The former of the two occurs in still creeks, and the like, along the rivers Yenisei and Abakan, at Askys, Ust Kamuishto, Uibat, and Ust Abakansk, on the Amyl, near Kushabar, at Ust Sisti-kem, as well as in creeks and branches of the Bei-kem, in swamps on the Dora Steppe.

The latter f. *terrestre* Leyss. collected by me near Ust Kamuishto and Uibat, on moist banks, bearing leaves only at the end of June.

Distribution: Europe, Caucasia, south-western Asia to Turkestan and the Himalayas, Siberia, northwards to about the arctic circle, northern Mongolia, eastern Asia, Sakhalin, the East Indies, North and South Africa, North America.

Polygonum viviparum L. Spec. Pl. ed. II (1762) p. 516; Ledeb. Fl. Alt. II, p. 78; Turczan. Cat. Baical. no. 966; Ledeb. Fl. Ross. III, p. 519; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 451, no. 977; Meisner, Monogr. Gen. *Polyg.* (1826) p. 52, no. 5; Meisner, *Polyg.* Haute-Asie, p. 347, no. 13; Herder, Pl. Radd. (1892) p. 240, no. 85; Крыл. Фл. Алт. V (1909) p. 1161.

This species, being very common in moist meadows on the islets in the rivers Yenisei and Abakan, in the Amyl taiga, and the Urjankai country, varies considerably in size and habitus, breadth of leaves, etc. There are to be found forms in which the leaves are quite smooth underneath, and others with the under side of the leaves rather densely pubescent. There are, however, between the various forms, marked intermediates.

On islets in the river Abakan, near Askys, I have collected a vigorous form, from 40 to 45 cm. high, with narrow, lanceolate, long-petioled radical leaves, to 12 cm. long, and 2,5 cm. broad. Probably belonging to f. *elongatum* Beck in Reichenb. Icon. XXIV (1906) p. 84. Similar vigorous forms, with broader radical leaves, are common in the Urjankai country, and abundant, for instance, between the Algiac Pass and Ust Algiac, as well as on the Kamsara.

In the Altaian, at an altitude of about 2000 m. above sea-level, I have collected a slender form, with quite smooth and very narrow leaves, only 0,3—0,5 cm. broad.

Distribution: Europe, and arctic islands, Caucasia, south-western and central Asia, Siberia, northwards to Taimyr (75° north latitude), northern Mongolia, eastern Asia, Sakhalin, North America, Greenland.

Polygonum Bistorta L. Spec. Pl. ed. II (1762) p. 516; Ledeb. Fl. Alt. II, p. 77; Turczan. Cat. Baical. no. 965; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 783; Ledeb. Fl. Ross. III, p. 518; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 450, no. 976; Meisner, Monogr. Gen. *Polyg.* p. 51; Herder, Pl. Radd. (1892) p. 245, no. 86; Крыл. Фл. Алт. V (1909) p. 1160.

Common in moist meadows, and on river-banks in the lower parts of the river Abakan, as well as near Kushabar, Ust Algiac and Ust Sisti-kem. Collected with flowers at Ust Abakan at the end of June, and with ripe fruits at Kushabar, about the middle of July. The specimens belong to f. *latifolium* Hayne, Arzney-Gew. V (1817) p. 19. *Polygonum bistorta α vulgaris* Meisner, l. c.

Besides, I have collected, near Kushabar, some specimens of a vigorous form, especially characteristic in having the under side of the leaves of a rusty brown colour. These specimens, therefore, are probably identical with specimens reported by Ledebour in Fl. Ross. III, p. 519 «*foliis latioribus, subtus parcius pilosis subferrugineis; pilis subrufis. — In provinciis Caucasicis et terris boreali-orientalibus.*» The form in question has the leaves underneath wholly and densely pubescent, of a rusty brown colour, giving the under side of the leaves a dark brown, frequently nearly felted or velvet-like appearance. I separate this characteristic form, the distribution of which seemed to be confined to easterly regions, as

f. **Ledebouriana** *nov. f.*

Folia subtus pilis densis, brevissimis, subrufis omnino tecta.

Distribution: The species occurs in Europe, except the extreme south, Novaya Zemlya, south-western Asia to Turkestan, Pamir, the Himalayas, the Thian-Shan, Siberia, northwards to Taimyr (74° 15′ north latitude), northern Mongolia, eastern Asia, Sakhalin, Japan, North America.

Fagopyrum tataricum (L.) Gaertn. De Fruct. et Sem. II (1791) p. 182; Ledeb. Fl. Ross. III, p. 517; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 449, no. 975; Herder, Pl. Radd. (1892) p. 211, no. 68. *Polygonum tataricum* L. Spec. Pl. ed. II (1762) p. 521; Meisner, Monogr. Gen. *Polyg.* p. 62, no. 28; Turczan. Cat. Baical. no. 968; Крыл. Фл. Алт. V (1909) p. 1159.

Common as weeds along road-sides, and the like, in the farming district between Minusinsk and Kushabar. Flowering in June.

Distribution: As weeds in Europe, Turkestan, central Asia, Siberia, eastern Asia, North America (introduced).

Fagopyrum esculentum Moench, Method. Pl. (1794) p. 290; Ledeb. Fl. Ross. III, p. 517; Herder, Pl. Radd. (1892) p. 210, no. 67. *Polygonum Fagopyrum* L. Spec. Pl. ed. II (1762) p. 522; Meisner, Monogr. Gen. *Polyg.* p. 61; Meisner, *Polyg.* Haute-Asie p. 353 (20); Крыл. Фл. Алт. V (1909) p. 1159.

Very commonly cultivated in the farming district between Minusinsk and Kushabar, and dispersed as weeds into the fields, along road-sides, and the like. Flowering in July.

Distribution: This species, probably a native of Mongolia, has been introduced into the temperate regions of the old and the new world, where cultivated, but occurring as weeds as well.

Atraphaxis frutescens (L.) Koch, Dendrol. II (1872) p. 360. *Polygonum frutescens* L. Spec. Pl. ed. II (1762) p. 516. *Atraphaxis lanceolata* Meisner in DC. Prodrom. XIV (1856) p. 78; Herder, Pl. Radd. (1892) p. 208, no. 65; Крыл. Фл. Алт. V (1909) p. 1156. *Tragopyrum lanceolatum* Marsch.-Bieb., Ledeb. Fl. Alt. II, p. 73; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 793; Ledeb. Fl. Ross. III, p. 515; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 448, no. 974.

Rather common on the dry Devonian slopes of sandstone on the Abakan Steppe, near Askys, near Ust Sisti-kem, Ust Kamsara, Ust Tara-kem, and on the dry steppes about the Ulu-kem, between Bjelosarsk and Cha-kul. The species flowers on the Abakan Steppe in June.

Distribution: South-eastern Russia and adjoining portions of Asia to Turkestan, Siberia, eastwards to Trans Baikal and northern Mongolia.

Rumex Acetosella L. Spec. Pl. ed. II (1762) p. 481; Ledeb. Fl. Alt. II, p. 61; Turczan. Cat. Baical. no. 989; Ledeb. Fl. Ross. III, p. 511; Turczan. Fl. Baical.-Dahur.

(1852, IV) p. 446, no. 973; Herder, Pl. Radd. (1892) p. 201, no. 63; Campdera, Monogr. *Rumex* (1819) p. 120; Meisner, *Polyg.* Haute-Asie p. 341 (8); Крыл. Фл. Алт. V (1909) p. 1155.

Rather common on dry sloping mountain-sides, and the like, near Kushabar and Ust Algiac. Taken with flowers and a few ripe fruits in the first half of July.

The specimens collected all belong to f. *vulgaris* Koch, Synops. ed. I (1836) p. 616, but are rather varying.

Distribution: Europe, Caucasia, Siberia (in the government of Tobolsk, northwards to 64° north latitude), eastern Asia, Sakhalin, Japan, the Himalayas, North and South Africa, North America, Greenland, Australia (introduced).

Rumex Acetosa L. Spec. Pl. ed. II (1762) p. 481; Ledeb. Fl. Alt. II, p. 60; Turczan. Cat. Baical. no. 988; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 796; Ledeb. Fl. Ross. III, p. 510; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 445, no. 971 ex parte; Herder, Pl. Radd. (1892) p. 205, no. 64; Campdera, Monogr. *Rumex* p. 117; Meisner, *Polyg.* Haute-Asie p. 341 (8); Крыл. Фл. Алт. V (1909) p. 1154.

Rather frequent in natural meadows, and the like, on the islets in the rivers Abakan and Yenisei, near Karatus, Kushabar, Ust Sisti-kem, and Tara-kem.

f. hirtulus Freyn, Abh. Z. B. G. Wien XXVII (1877) p. 415.

Some specimens of this one I have gathered on islets in the river Abakan, near Ust Abakansk.

Distribution: The species is distributed over Europe, temperate parts of Asia, southwards to the Himalayas, South Africa, North and South America, Greenland, Australia.

Rumex arifolius Allioni, Fl. Pedemont. II (1785) p. 204. *Rumex montanus* Desf., Ledeb. Fl. Ross. III, p. 510.

In meadows and grass-grown places, near Karatas and Kushabar, and in the Urjankai country, near Ust Algiac, Ust Sisti-kem, and on flood-plains, near Ust Tara-kem.

Distribution: Europe, Siberia, northern Mongolia.

Rumex thyrsiflorus Fingerh. Linnaea IV (1829) p. 380. *Rumex acetosa β auriculatus* Koch, Ledeb. Fl. Ross. III, p. 511. *Rumex haplorrhizus* Czern., Turczan. Fl. Baical.-Dahur. (1852, IV) p. 445, no. 972. *Rumex acetosa* in Karel. et Kiril. Enum. Pl. Fl. Alt. no. 796; Turczan. Cat. Baical. no. 988 ex parte.

On islets in the river Abakan, scattered in natural meadows.

Distribution: Northern, middle, and eastern Europe, Siberia.

Rumex aquaticus L. Spec. Pl. ed. II (1762) p. 479; Ledeb. Fl. Alt. II, p. 60; Ledeb. Fl. Ross. III, p. 508; Herder, Pl. Radd. (1892) p. 189, no. 51; Campdera, Monogr. *Rumex* p. 100—102; Крыл. Фл. Алт. V (1909) p. 1152.

Scattered along the borders of brooks, and the like, between Minusinsk and Kushabar, on the banks of the Upper Sisti-kem as well as of the Tara-kem, near the Bei-kem. Taken with flowers in July and at the beginning of August.

Distribution: Europe, Caucasia, Siberia (northwards to 68° north latitude in the Yenisei valley), northern Mongolia, the Thian-Shan, eastern Asia, Japan, North America.

Rumex crispus L. Spec. Pl. ed. II (1762) p. 476; Ledeb. Fl. Alt. II, p. 57; Ledeb. Fl. Ross. III, p. 505; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 443, no. 967; Campdera, Monogr. *Rumex* p. 95—97; Meisner, *Polyg.* Haute-Asie p. 338 (5); Herder, Pl. Radd. (1892) p. 193, no. 55; Крыл. Фл. Алт. V (1909) p. 1150.

In moist places, on the banks of a brook, near Karatus, Kalna, Ust Algiac, Ust Sisti-kem, Ust Kamsara, Ust Tara-kem, the Sebi, and the Tapsa. Collected with flowers at the beginning of July, and with fruits in August.

Distribution: Europe, Caucasus, Siberia (in the Yenisei valley northwards to 66° north latitude, not occurring in the regions from Trans Baikal to the Sea of Okhotsk.), northern Mongolia, China, Sakhalin, Japan, south-western Asia to Turkestan, North Africa, North and South America (introduced), Australia (introduced).

Rumex domesticus Hartm. Scand. Fl. ed. I (1820) p. 148; Ledeb. Fl. Alt. II, p. 60; Ledeb. Fl. Ross. III, p. 506; Turczan, Fl. Baical.-Dahur. (1852, IV) p. 443, no. 968; Herder, Pl. Radd. (1892) p. 191, no. 54; Meisner, *Polyg.* Haute-Asia p. 388 (5). *Rumex aquaticus* in Turczan. Cat. Baical. no. 987.

Taken at Kushabar and Kalna, near the river Amyl, with flowers and young fruits in the middle of July, and, besides, at Ust Algiac and Ust Sisti-kem.

Distribution: Europe, except the extreme south, Novaya Zemlya, Siberia, northern Mongolia, eastern Asia, Sakhalin, North America, Greenland.

Rumex maritimus L. Spec. Pl. ed. II (1762) p. 478; Ledeb. Fl. Ross. III, p. 500; Campdera, Monogr. *Rumex* p. 76—78; Nilsson, Øfversigt af Sl. *Rumex* (Bot. Not. 1887) p. 224; Herder, Pl. Radd. (1892) p. 188, no. 60; Крыл. Фл. Алт. V (1909) p. 1149.

Occurring on the river Abakan, near Askys, on sandy banks, and at Kalna, near habitations, in thickets of birch and spruce, in swampy, moss- and grass-grown places, accompanying *Rubus arcticus* and *Vaccinium uliginosum*. Taken with young flowers in the middle of July. The characteristic oblong grains on the backs of the inner sepals are not so distinctly developed in the specimens collected as is commonly the case in the Norwegian specimens I have had for comparison. The grains are, besides, rather frequently of a darker brown.

Distribution: Europe, except the extreme south, south-western Asia to Turkestan, Siberia (northwards to 66° 40′ in the government of Tobolsk), eastern Asia, Sakhalin, the East Indies, North Africa.

Oxyria digyna (L.) Hill, Hort. Kew. (1769) p. 158. *Oxyria reniformis* Hook. Fl. Scot. (1821) p. 111; Ledeb. Fl. Alt. II, p. 56; Turczan. Cat. Baical. no. 984; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 797; Ledeb. Fl. Ross. III, p. 498; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 441, no. 965; Herder, Pl. Radd. (1892) p. 186, no. 50; Крыл. Фл. Алт. V (1909) p. 1146; Campdera, Monogr. *Polyg.* p. 153—156.

Rather common in the Altaian, at an altitude of 1800—2000 m. above sea-level, on moist, cool slopes with a northern aspect, among lichens and mosses, accompanying *Cardamine bellidifolia, Papaver nudicaule, Valeriana capitata, Ranunculus frigidus,* and others. The specimens agree perfectly with Norwegian ones. Collected in full flower at the end of July.

Distribution: Arctic islands, arctic and alpine regions of Europe, Siberia, the Caucasus, Asia Minor, northern Persia, Tibet, the Himalayas, Pamir, the Thian Shan, the Altai, the Sayansk district, North America, Greenland.

Chenopodiaceae VENT.

Chenopodium aristatum L. Spec. Pl. ed. II (1762) p. 321; Ledeb. Fl. Alt. I, p. 410; Turczan. Cat. Baical. no. 950; Bunge, Enum. *Salsol.* Centrasiatic. p. 405 et 454; Крыл. Фл. Алт. V (1909) p. 1101. *Teloxys aristata* Moqu.-Tand. in Annal. Sc. Nat. 2, Ser. I, p. 289; Ledeb. Fl. Ross. III, p. 693; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 407, no. 936; Herder, Pl. Radd. (1889) p. 583, no. 1.

Scattered on the steppes about Minusinsk, near Buistraja, and near Tagarski osero. With young flowers at the beginning of July.

Distribution: Southern Siberia, Russian Turkestan, northern and eastern Mongolia, eastern Asia, North America. Observed, besides, as weeds near Berlin, Buda-Pest, and Venice.

Chenopodium vulvaria L. Spec. Pl. ed. II (1762) p. 321; Ledeb. Fl. Ross. III, p. 695; Крыл. Фл. Алт. V (1909) p. 1097.

Dispersed about Minusinsk. Flowering at the beginning of June.

Distribution: Europe, Caucasia, and south-western Asia to Turkestan and Pamir, southern Siberia, eastwards to the government of Yeniseisk, North Africa.

Chenopodium glaucum L. Spec. Pl. ed. II (1762) p. 320; Ledeb. Fl. Alt. I, p. 407; Turczan. Cat. Baical. no. 947; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 751; Ledeb. Fl. Ross. III, p. 700; Bunge, Enum. *Salsol.* Centrasiatic. no. 6; Herder, Pl. Radd. (1889) p. 589, no. 6; Крыл. Фл. Алт. V (1909) p. 1099. *Blitum glaucum* Koch, Turczan. Fl. Baical.-Dahur. (1852, IV) p. 413, no. 943.

At Tagarski osero, near habitations. With young flowers at the beginning of July.

Distribution: Nearly all over Europe and temperate Asia, Sakhalin, moreover, in North and South America, Greenland, North and South Africa, Australia, partly in slightly differing forms, and at any rate partly introduced.

Chenopodium album L. Spec. Pl. ed. II (1762) p. 319; Ledeb. Fl. Alt. I, p. 404; Turczan. Cat. Baical. no. 944; Ledeb. Fl. Ross. III, p. 697; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 410, no. 940; Bunge, Enum. *Salsol.* Centrasiatic. no. 5; Herder, Pl. Radd. (1889) p. 586, no. 5; Крыл. Фл. Алт. V (1909) p. 1098. *Chenopodium serotinum* in Ledeb. Fl. Alt. I, p. 405, non L.

The species was rather frequently met with by me in the regions of southern Siberia and the Urjankai country, where especially occurring about habitations, by road-sides, on the borders of fields, etc., such as about Minusinsk, and in several places between Minusinsk and Kushabar. The species appears to be rather varying here as well as in Europe. By the investigations of MURR and LUDWIG, some forms have proved to be constant when produced from seed, and others have not. The material collected by me early in summer, in June and at the beginning of July, is too young to make possible an absolutely certain determination, the more so as the species here in Asia, no doubt in part at least, occurs under other forms than in Europe.

Distribution: Occurring in all parts of the world, except the arctic regions. In Europe northwards to Iceland and the Faroe Island, in Siberia — in the Yenisei valley — to 69° 45′ north latitude.

Chenopodium rubrum L. Spec. Pl. ed. II (1762) p. 318. *Blitum polymorphum* C. A. Meyer in Ledeb. Fl. Alt. I, p. 13; Ledeb. Fl. Ross. III, p. 770; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 412, no. 942; Bunge, Enum. *Salsol.* Centrasiatic. p. 406 et 954; Крыл. Фл. Алт. V (1909) p. 1103. *Blitum rubrum* C. A. Meyer in Ledeb. Fl. Alt. I, p. 11; Herder, Pl. Radd. (1889) p. 596, no. 13.

Near the habitations of the Abakan Tatars at Ust Kamuishto, and near Ust Abakansk. Young flowers at the end of June.

Distribution: Europe, northwards to southern Scandinavia, south-western Asia to Turkestan and Pamir, Mongolia, Siberia (in the Yenisei valley northwards to 68° 10′ north latitude), Manchooria (Mukden), the Azores, North America.

Atriplex litorale L. Spec. Pl. ed. II (1763) p. 1494; Ledeb. Fl. Alt. IV, p. 311; Turczan. Cat. Baical. no. 956; Fenzl in Ledeb. Fl. Ross. III, p. 729; Turczan. Fl. Baical.-Dahur. (1852, IV), p. 415, no. 944; Bunge, Enum. *Salsol.* Centrasiatic. no. 24; Herder, Pl. Radd. (1889) p. 604, no. 21; Крыл. Фл. Алт. V (1909) p. 1113.

Near salt swamps and in saline soil on the Abakan Steppe, near Ust Kamuishto.

Distribution: On the coasts of Europe, more rarely inland, south-western and central Asia, southern Siberia, north-eastern Mongolia, Manchooria, northern China, Japan, Sakhalin (var.), north-western America.

Atriplex patulum L. Spec. Pl. ed. II (1763) p. 1494; Ledeb. Fl. Alt. IV, p. 310; Fenzl in Ledeb. Fl. Ross. III, p. 725; Bunge, Enum. *Salsol.* Centrasiatic. no. 24; Herder, Pl. Radd. (1889) p. 602, no. 20; Крыл. Фл. Алт. V (1909) p. 1112.

As weeds by road-sides, etc., on the Abakan Steppe, near Ust Abakansk.

Distribution: Europe, except the most northern regions, south-western Asia to Turkestan, Siberia, Manchooria, Sakhalin, North Africa, North America.

Atriplex sibiricum L. Spec. Pl. ed. II (1763) p. 1493; Ledeb. Fl. Alt. IV, p. 315; Turczan. Cat. Baical. no. 957; Крыл. Фл. Алт. V (1909) p. 1114. *Obione muricata* Gärtn.,

Ledeb. Fl. Ross. III, p. 734; Herder, Pl. Radd. (1889) p. 606, no. 24. *Obione sibirica* Fischer, Cat. Hort. Gorenk. (1808) p. 25; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 417, no. 946.

On the Abakan Steppe, near Askys, as weeds, and in saline soil. Young flower-buds in the second half of June.

Distribution: South-eastern Russia and south-western Asia to Turkestan, southern Siberia, north-eastern Mongolia, Manchooria, China.

Eurotia ceratoides C. A. Meyer in Ledeb. Fl. Alt. IV, p. 239; Turczan. Cat. Baical. no. 959; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 779; Fenzl in Ledeb. Fl. Ross. III, p. 738; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 421, no. 950; Herder, Pl. Radd. (1889) p. 607, no. 25; Крыл. Фл. Алт. V (1909) p. 1116.

On the Abakan Steppe, near Ust Abakansk, and in the Urjankai country, on the steppes on the Ulu-kem.

Distribution: Spain, Hungary, south-eastern Russia and adjacent parts of south-western and central Asia to Pamir, the Himalayas, Tibet and Beloochistan, southern Siberia, roughly to Lake Baikal, northern Mongolia, northern China, North Africa.

Kochia prostrata Schrad. Neues Journ. III (1809) p. 85; Ledeb. Fl. Alt. I, p. 412; Turczan. Cat. Baical. no. 951; Fenzl in Ledeb. Fl. Ross. III, p. 747; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 425, no. 952; Herder, Pl. Radd. (1889) p. 610, no. 28; Крыл. Фл. Алт. V (1909) p. 1120.

f. *flavescens* Lagaska, Mem. Pl. Barill. (1817) p. 37. *Kochia prostrata α virescens* Fenzl in Ledeb. Fl. Ross. III, p. 748; Крыл. l. c. p. 1120.

Near Ust Uss, on dry declivities, partly done flowering at the beginning of September.

Distribution: Southern and south-eastern Europe, Caucasia, south-western and central Asia to Pamir, Tibet and the Himalayas, southern Siberia to the government of Irkutsk, northern Mongolia, north-western Manchooria, North Africa.

Salicornia herbacea L. Spec. Pl. ed. II (1762) p. 5; Ledeb. Fl. Alt. I, p. 2; Turczan. Cat. Baical. no. 955; Fenzl in Ledeb. Fl. Ross. III, p. 767; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 430, no. 957; Bunge, Enum. *Salsol.* Centrasiatic. no. 57; Herder, Pl. Radd. (1889) p. 617, no. 38; Крыл. Фл. Алт. V (1909) p. 1127.

f. *stricta* (Willd.) G. F. W. Meyer in Hannøv. Magaz. (1824) p. 178. *Salicornia herbacea α leptostachya* Fenzl in Ledeb. Fl. Ross. III, p. 767 ex parte; Крыл. l. c.

Rather common on the Abakan Steppe, in salt swamps etc., at Ust Kamuishto, where occurring in abundance. Specimens collected here in the second half of June, are young, without fully developed flowers. The specimens are about 15 cm. high, with thick, coarse, and long branches, which are ascendent, nearly parallel to the main axis.

Distribution: On the coasts of Europe, and inland in saline soil, south-western Asia to Turkestan, Siberia, northern Mongolia, eastern Asia, Sakhalin, the East Indies, North and South Africa, North America.

Suaeda maritima (L.) Dumort. Fl. Belg. (1827) p. 22; Ledeb. Fl. Ross. III, p. 786; Крыл. Фл. Алт. V (1909) p. 1131. *Chenopodina maritima* Moquin in DC. Prodrom. XIII, 2, p. 161; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 433, no. 959. *Schoberia maritima* C. A. Meyer in Ledeb. Fl. Alt. I, p. 400.

Rather common in salt swamps on the Abakan Steppe, accompanying the preceding one. Specimens taken here in the second half of June, are sterile.

Distribution: Europe, south-western Asia to Pamir, southern Siberia, eastern Asia, Japan, the East Indies, Ceylon, North and South Africa, North and South America, Australia.

Suaeda corniculata (C. A. Meyer) Bunge in Act. Hort. Petropol. VI, p. 429; Turczan. Cat. Baical. no. 942; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 751; Шмальг. Фл. Средн. и Южн. Росс. II, п. 379; Крыл. Фл. Алт. V (1909) p. 1131. *Schoberia corniculata* C. A. Meyer in Ledeb. Fl. Alt. I, p. 399; Ledeb. Fl. Ross. III, p. 791; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 434, no. 960; Herder, Pl. Radd. (1889) p. 620, no. 40.

In saline soil, near Togarski osero. Flowering specimens have been taken at the beginning of July. The specimens have the stems ascending and branched from the base, with long branches of the same length as the stems themselves, f. *adscendens* Kryl. l. c.

Distribution: Southern and eastern Russia, south-western Asia, Turkestan, western Tibet, southern Siberia to the governments of Yakutsk and Trans Baikal, north-eastern Mongolia.

Salsola collina Pallas, Illustrat. Pl. Imperf. Cognit. (1803) pl. 34, t. 26; C. A. Meyer in Ledeb. Fl. Alt. I, p. 393; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 745; Ledeb. Fl. Ross. III, p. 800; Turczan. Fl. Baical.-Dahur. (1852, IV) p. 437, no. 962; Herder, Pl. Radd. (1889) p. 623, no. 42; Крыл. Фл. Алт. V (1909) p. 1134.

f. *subhirta* C. A. Meyer, l. c.; Крыл. l. c.

On the Abakan Steppe, near Ust Kamuishto, on saliferous soil, and near Togarski osero, at Minusinsk, on sandy ground. Only young specimens with young flowers at the beginning of July.

Distribution: Southern Russia, south-western Asia, Turkestan, Tibet, southern Siberia, northern Mongolia, eastern Asia, the East Indies. (In Europe, for the rest, at Mannheim in Baden as an accidental weed).

Portulacaceae Juss.

? Montia fontana L. Spec. Pl. ed. II (1762) p. 129; Ledeb. Fl. Ross. II, p. 152.

This plant has been noted down by me from the Urjankai country, near the Dora Steppe, by a fountain in brush-wood of *Betula humilis* and other foliferous trees. But as it is not to be found in my collections arrived, and has not previously been

reported from the Altai region either, being said, on the contrary, to be wanting in central Asia, there remains a possibility of a mistake of identity, and I therefore dare only enter it with a sign of interrogation.

Distribution: Europe, south-western Asia, eastern Siberia, North Africa, North and South America, Australia.

Caryophyllaceae TORR. ET GRAY.

Cerastium pilosum Ledeb. in Mem. Acad. St. Petersb. V (1815) p. 514 et 539; Ledeb. Fl. Alt. II, p. 178; Turczan. Cat. Baical. no. 263; Ledeb. Fl. Ross. I, p. 398; Turczan. Fl. Baical.-Dahur. (1842) p. 611, no. 252; Grenier, Monogr. *Cerast.* (1841) p. 18; Regel, Pl. Radd. (1862) p. 308, no. 347; Крыл. Фл. Алт. I (1901) p. 173.

Scattered in thickets between Karatus and Kushabar, and in the subalpine wood regions between the Algiac Pass and Ust Algiac, where I have taken it flowering and in part done flowering about the middle of July.

Distribution: Southern Siberia from the Ural to Manchoofia and northern Corea, northern Mongolia.

Cerastium vulgatum L. Fl. Suec. ed. II (1755) p. 158; Ledeb. Fl. Ross. I, p. 408 ex parte; Herder, Pl. Radd. (1862) p. 313, no. 353; Крыл. Фл. Алт. I (1901) p. 175. *Cerastium triviale* Link, Enum. Pl. Hort. Berol. I (1821) p. 433; Ledeb. Fl. Alt. II, p. 181. *Cerastium viscosum* L. Spec. Pl. ed. II (1762) p. 627; Turczan. Fl. Baical.-Dahur. (1842) p. 613, no. 255; Grenier, Monogr. *Cerast.* (1841) p. 38.

In thickets between Karatus and Kushabar, and of rather common occurrence in the subalpine wooded tracts about the Upper Amyl and about the river Sisti-kem, and at Ust Tara-kem, in grassy and moss-grown places. Nearly past flowering, and with ripe capsules in the second half of July. The lower part of the stem is, in the specimens collected, furnished with dense, spreading hairs, and the upper part with dense, glandular hairs. The leaves are pubescent, without glandular hairs. The petals are of the same length as the sepals, or shorter, from 5 to 7 mm. long, acute at the summit, and scarious-margined, viscid-pubescent. The ripe capsules are slightly curved, of about twice the length of the sepals. The peduncles, which are beset with dense, glandular hairs, are generally somewhat longer than the calyx. It seemed to agree perfectly with *α brachypetalum* f. *glandulosum* FENZL.

Distribution: Europe, Caucasia, Siberia from the Ural to Kamtchatka, Sakhalin, Japan, Russian Turkestan, the Thian Shan, Tibet, India, Ceylon, North America, Greenland.

Cerastium arvense L. Spec. Pl. ed. II (1762) p. 628; Крыл. Фл. Алт. I (1901) p. 176. *Cerastium arvense* L. f. *angustifolium* Fenzl in Ledeb. Fl. Ross. I, p. 412; Herder, Pl. Radd. (1862) p. 325, no. 355. *Cerastium incanum* Ledeb. Fl. Alt. II, p. 180; Turczan. Cat. Baical. no. 266; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 177; Turczan. Fl. Baical.-Dahur. (1842) p. 614, no. 256.

The plants are rather densely beset with pretty long, white hairs, pointing downwards, their upper half, like the sepals, rather viscid-pubescent. The sepals are scarious-margined, partly of a pretty, wine-red colour. The leaves are rather densely pubescent, to 4 mm. broad, generally, however, only 2 mm. broad, and to 20 mm. long. The petals are 11 to 13 mm. long, the bracts scarious-margined at the summit. Very common in the steppe region about the lower Abakan, especially in grass-grown, not too dry places, where I have taken it in flower and partly done flowering in the middle of June.

Distribution: Europe, northwards to middle Scandinavia, Caucasia, Turkestan, Siberia, Mongolia, eastern Asia to the north of China, North Africa, northern and middle America, Greenland.

Stellaria Bungeana Fenzl in Ledeb. Fl. Ross. I, p. 376; Turczan. Addenda ad Fl. Baical.-Dahur. (1857) p. XIII; Крыл. Фл. Алт. (1901) p. 165. *Stellaria nemorum* L. apud Ledeb. Fl. Alt. II, p. 152; Turczan. Cat. Baical. no. 235; Turczan. Fl. Baical.-Dahur. (1842) p. 599, no. 236. *Stellaria nemorum β Bungeana* Regel, Pl. Radd. (1862) p. 269, no. 319.

In grass-grown thickets, chiefly consisting of *Caragana arborescens*, between Minusinsk and Ust Abakansk, where it occurs flowering at the beginning of June. All of the specimens collected belong to f. *latifolia* Regel, l. c. The same form is also frequent near Kushabar, in the Amyl taiga, and in the Urjankai country, near Ust Algiac.

Distribution: Eastern Russia, southern Siberia, eastwards to the Sea of Okhotsk, Manchooria, China, Corea.

Stellaria media (L.) Vill. Hist. Pl. Dauph. III (1789) p. 615; Ledeb. Fl. Alt. II, p. 153; Turczan. Cat. Baical. no. 236; Fenzl in Ledeb. Fl. Ross. I, p. 377; Turczan. Fl. Baical.-Dahur. (1842) p. 599, no. 237; Regel, Pl. Radd. (1862) p. 270, no. 320; Крыл. Фл. Алт. I (1901) p. 165.

This species did not seem to be of very frequent occurrence in the territory explored. In my collections I have, by the way, only some specimens, taken in the village of Kushabar, near a farm-yard, in the middle of July. The stems are unilaterally hairy; the shape and size of the leaves much varying, commonly medium-sized, from narrowly ovate to broadly cordiform, the breadth equalling or even exceeding the length. The sepals, which are beset with scattered glandular hairs, are broadly lanceolate to ovate, rounded at the summit. The petals are about ⅔ as long as the sepals. The seeds, about 1 mm. in diameter, are orbicular-reniform, of a chestnut colour, slightly warty, and beset with very fine, long, scattered hairs. The pedicels are commonly from 2 to 4, rarely to 10 times as long as the sepals. The specimens seemed to belong to the form *oligandra* Fenzl in Ledeb. Fl. Ross. I, p. 377.

Distribution: The species occurs nearly all over the globe.

Stellaria dichotoma L. Spec. Pl. ed. II (1762) p. 603; Turczan. Cat. Baical. no. 247; Fenzl in Ledeb. Fl. Ross. I, p. 378; Turczan. Fl. Bacial.-Dahur. (1842) p. 600, no. 238; Regel, Pl. Radd. (1862) p. 271, no. 321.

subspec. **cordifolia** Bunge, Enum. Alt. p. 34; Крыл. Фл. Алт. I (1901) p. 166.

On stony declivities and dry meadows on the Abakan Steppe, near Ust Kamuishto, where occurring in full flower in the second half of June. The specimens collected belong to f. *glandulosa* REGEL, l. c. *(Stellaria Schlechtendahliana* et *Pallasiana* SER. in DC. Prodrom. I, p. 397). This species is, at any rate to judge from my material, very characteristic in having the somewhat swollen nodes rather fragile, so that they are easily broken when dry.

Distribution: Scattered in southern Siberia from the eastern Altai to Trans Baikal, besides, near Omsk, and in the Ural (LESSING), northern Mongolia.

Stellaria crassifolia Ehrh. Hann. Magaz. VIII (1784) p. 116; Ledeb. Fl. Alt. II, p. 156 (Lus. 1); Turczan. Cat. Baical. no. 244; Fenzl in Ledeb. Fl. Ross. I, p. 383; Turczan. Fl. Baical.-Dahur. (1842) p. 606, no. 246; Regel, Pl. Radd. (1862) p. 275, no. 323; Крыл. Фл. Алт. I (1901) p. 167.

subspec. **paludosa** Fries, Novit. Fl. Suec. Mant. III (1842) p. 192.

In moist, shady thickets, and in moss-grown meadows, on an islet in the river Abakan, near Askys. In full flower in the middle of June. The leaves in the specimens collected are narrowly ovate, up to 1,5 cm. long, and 0,7 cm. broad, gradually and slightly acuminate towards the summit, f. *oblongifolia,* FENZL, l. c; REGEL, l. c.

Distribution: Northern and middle Europe, Iceland, Novaya Zemlya, Siberia to Kamtchatka, North America.

Stellaria longipes Goldie in Edinb. Phil. Journ. VI (1822) p. 183; Fenzl in Ledeb. Fl. Ross. I, p. 386; Regel, Pl. Radd. (1862) p. 295, no. 335; Крыл. Фл. Алт. I (1901) p. 168.

subspec. **stricta** (Rich.) Fenzl, l. c. *Stellaria stricta* Rich., Turczan. Fl. Baical.-Dahur. (1842) p. 604, no. 243.

In the Altaian, on the sources of the Upper Sisti-kem, near the limit of tree vegetation. In full flower at the end of July.

Distribution: Arctic Europe, arctic Siberia, in the Altai and Sayansk mountains, eastwards to Trans Baikal, northern Mongolia.

Stellaria discolor Turczan. Cat. Baical. no. 241; Fenzl in Ledeb. Fl. Ross. I, p. 389; Turczan. Fl. Baical.-Dahur. (1842) p. 601, no. 239; Maxim. Mel. Biol. IX, p. 47; Regel, Pl. Radd. (1862) p. 284, no. 330.

This species is especially characteristic in having the stems rigid, erect and distinctly quadrangular; the leaves are sessile, rather broad and lanceolate, frequently of a paler greyish colour on the under side, and with a strongly marked midrib and recurved margin. Not unfrequent in meadows on the islets in the lower part of the river Abakan, and in the Yenisei, where I have collected it with flowers at the end of June. The specimens agree perfectly with specimens I have seen in KARO, Plantae Amuricae et Zeaënse, no. 143.

Distribution: The species has previously been recorded from the Amoor Province, Manchooria, Dahurica, and eastern Mongolia.

Stellaria palustris Ehrh. Beitr. Naturk. V (1789) p. 176; Retz. Fl. Scand. Prodr. ed. II (1795) p. 106. *Stellaria glauca* Wither. Bot. Arrang. Brit. Pl. ed. III, 3 (1796) p. 420; Turczan. Cat. Baical. no. 242; Fenzl in Ledeb. Fl. Ross. I, p. 389; Regel, Pl. Radd. (1862) p. 289, no. 334. *Stellaria glauca, Laxmanni, dahurica, falcata et velutina* DC. Prodrom. I, p. 397, 398, 399. *Stellaria glauca* et *falcata* in Turczan. Fl. Baical.-Dahur. (1842) p. 602, no. 240 et p. 603, no. 242. *Stellaria glauca* With., Крыл. Фл. Алт. I (1901) p. 169. *Stellaria davurica* Willd., Ledeb. Fl. Ross. I, p. 388.

Pretty common in the tracts about the rivers Abakan and Yenisei, where I have taken it flowering and with flower-buds in June. The length of the petals is 7 to 8 mm. Most of the specimens collected belong to f. *communis* Fenzl, l. c.

Near Ust Kamuishto I have collected specimens of a larger, more vigorous form, of a more markedly green colour, with rather large flowers, f. *Laxmanni* (Fisch.) Simonkai, Enum. Fl. Transs. (1886) p. 137. *Stellaria Laxmanni* Fisch. in DC. Prodrom. I, p. 397; Ledeb. Fl. Alt. II, p. 158. *Stellaria glauca* Wither. var. *virens* Fenzl, l. c.

Distribution: Northern and middle Europe, southwards to northern Italy, Corsica, Bulgaria, Caucasia, south-western Asia to Tibet, the Himalayas and India, Siberia, Mongolia, northern China, Greenland (?), Australia (?).

Stellaria graminea L. Spec. Pl. ed. II (1762) p. 604; Ledeb. Fl. Alt. II, p. 159; Turczan. Cat. Baical. no. 239; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 166; Fenzl in Ledeb. Fl. Ross. I, p. 391; Turczan. Fl. Baical.-Dahur. (1842) p. 603, no. 241; Regel, Pl. Radd. (1862) p. 284, no. 331; Крыл. Фл. Алт. I (1901) p. 169. *Stellaria brachypetala* Bunge in Ledeb. Fl. Alt. II, p. 161; Fenzl in Ledeb. Fl. Ross. I, p. 390.

Of rather frequent occurrence in the tracts about the Lower Abakan, and in the subalpine meadows in woods between Kushabar and Ust Algiac. In full flower in June and July. I have collected a rather rich material of this species, which appears not to be distinctly separated from the preceding one. Besides more typical specimens there also occur here transition forms to *Stellaria palustris* and forms combining characters from both of these species.

Distribution: Europe, temperate Asia.

Stellaria longifolia Mühlenb. in Willd. Enum. Hort. Berol. (1809) p. 479; Fenzl in Ledeb. Fl. Ross. I, p. 392 ex parte; Regel, Pl. Radd. (1862) p. 287, no. 332; Крыл. Фл. Алт. I (1901) p. 170.

Common in thickets on the islets in the river Abakan. In full flower in June. Besides the typical species there also frequently occur here specimens appearing to be intermediate between this one and *Stellaria graminea* and forms with foliaceous, green bracts, thus, by this character recalling *Stellaria alpestris*.

Distribution: Northern and middle Europe, Siberia, eastern Asia, Sakhalin, Japan, North America.

Stellaria uliginosa Murr. Prodrom. Goetting. (1770) p. 55; Ledeb. Fl. Ross. I, p. 393; Turczan. Fl. Baical.-Dahur. (1842) p. 606, no. 245; Regel, Pl. Radd. (1862) p. 281, no. 328; Крыл. Фл. Алт. I (1901) p. 171. *Stellaria aquatica* Poll. Hist. Pl. Palat. I (1776) no. 422; Turczan. Cat. Baical. no. 246. *Stellaria Alsine* Reichard, Fl. Moeno-Francofurt. (1772) no. 286; Ledeb. Fl. Alt. II, p. 156.

In grass-grown places, near Kushabar, flowering in July.

Distribution: Europe, Caucasia, southern Siberia, middle and eastern Asia, the East Indies, North America, Greenland.

Stellaria petraea Bunge in Ledeb. Fl. Alt. II, p. 160; Fenzl in Ledeb. Fl. Ross. I, p. 394; Turczan. Fl. Baical.-Dahur. (1842) p. 608, no. 249; Regel, Pl. Radd. (1862) p. 303, no. 340; Крыл. Фл. Алт. I (1901) p. 171.

On the Abakan Steppe, near Askys, on dry, rocky slopes, in chinks of rocks, among stones and gravel, near the hill-tops. In full flower in the middle of June.

Distribution: The Altai region, and further eastwards to the Amoor Province, Mongolia.

Moehringia lateriflora (L.) Fenzl, Verbreit. *Alsin.* in Tab. Synopt. (1833) p. 18 et 38; Fenzl in Ledeb. Fl. Ross. I, p. 371; Turczan. Fl. Baical.-Dahur. (1842) p. 596, no. 234; Regel, Pl. Radd. (1862) p. 257, no. 316; Крыл. Фл. Алт. I (1901) p. 162. *Arenaria lateriflora* L. Spec. Pl. ed. II (1762) p. 605; Ledeb. Fl. Alt. II, p. 173; Turczan. Cat. Baical. no. 261.

This species I have found to be rather common in moist, shady thicket of *Caragana arborescens* and *Cotoneaster melanocarpa*, on the steppes about the Yenisei, near Ust Abakansk. It is, moreover, of common occurrence in the subalpine wooded tracts between Kushabar and Ust Algiac, and also in alpine regions in the Altaian. Specimens from the different localities prove to be considerably varying. However, all of them belong to the form series of *Moehringia lateriflora*, with obtuse sepals. Forms with acute sepals, distinguished as *Moehringia umbrosa* (Bunge) Fenzl, do not occur in my material. The specimens vary considerably in the size of the flowers, the shape and size of the leaves, the height and vigorousness of the stem, and also in the hairiness. Specimens taken by me in the lowland at Minusinsk, are distinguished by glabrous stems and leaves, or nearly so, only the peduncles, immediatly below the flower, being scattered pubescent. These specimens are also characteristic in having the flowers comparatively large, the diameter of which may reach up to 13 mm., i. e. 4 times as long as the obtuse, ovate, glabrous, and slightly scarious-margined sepals, completely nerveless. There occurs for the rest, every transition between this form, which most properly has to be referred to f. *glabrescens* Regel, l. c., and the forms *typica* and *intermedia*. Regel's limitation and grouping of the numerous varieties and forms of *Moehringia lateriflora* seemed, for the rest, not to be maintainable. The descriptions are also so incomplete that most frequently it is impossible to unravel them, even if his authentic

material is at hand. Near Ust Algiac I have collected specimens of a form with narrow, equally broad leaves, to 25 mm. long, and 6 mm. broad.

Specimens from alpine tracts in the Altaian have the stems densely pubescent, and the petals considerably shorter, only about 3 mm. long, i. e. one and a half to twice the length of the calyx. The species has been collected flowering by me from the beginning of June to the end of July.

Distribution: Northern Scandinavia, northern and north-eastern Russia, almost throughout Siberia, northern Mongolia, Manchooria, China, Corea, Sakhalin, Japan, North America.

Arenaria serpyllifolia L. Spec. Pl. ed. II (1762) p. 605; Ledeb. Fl. Alt. II, p. 175; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 170; Fenzl in Ledeb. Fl. Ross. I, p. 368; Williams, Revis. Gen. *Arenaria* in Journ. Lin. Soc. vol. 33 (1897—98) p. 365; Крыл. Фл. Алт. I (1901) p. 161.

Of this rather polymorphous species I have collected only some few specimens on dry hills, near Kushabar. These specimens are distinguished by their much branched stems, from 10 to 15 cm. high, ascending and geniculate at the base, especially in their upper parts densely glandular hairy. The leaves are 3—4 mm. long, 2—2,5 mm. broad, tapering upwards, and acuminate, with 1 or 3 nerves. The sepals are lanceolate, tapering upwards, mucronate at the summit, generally 3-nerved, glandular hairy along the nerves, broadly scarious-margined. The scarious-margin is about as broad as the green part of the sepals. The petals are about ⅔ shorter than the calyx. The ripe capsules are yellow, glabrous, and glassy, of about the same length as the sepals, or somewhat longer, urceolate, their lower part globularly inflated. The pedicels are straight, capillaceous, 2—3 times as long as the calyx. Rather flowery. Taken with ripe fruits, and some in flower, in the middle of July. The seeds are small, about 0,6 mm. in diameter, globular-reniform, of a nearly black colour, slightly shining, densely rugose in regular rows.

Distribution: Europe, northwards to about 69° north latitude, the Caucasus and south-western Asia to Tibet, the Himalayas, India, Siberia, Corea, Japan, north and tropical Africa, North America.

Alsine verna (L.) Bartl. Beitr. II (1824—25) p. 63; Fenzl in Ledeb. Fl. Ross. I, p. 347; Turczan. Fl. Baical.-Dahur. (1842) p. 591, no. 228; Regel, Pl. Radd. (1862) p. 218, no. 302; Крыл. Фл. Алт. I (1901) p. 157. *Arenaria costata* et *paniculata* Bunge apud Ledeb. Fl. Alt. I, p. 168—171. *Arenaria verna* Karel. et Kiril. Enum. Pl. Fl. Alt. no. 172.

In the material collected of this very polymorphous species, all the specimens have the stems 1 to 2-flowered, short, 3—5 cm. high, fine, densely tufted, frequently of a darkish colour, ascending, or geniculate below, surrounded at the base by withering leaves. The leaves are 3-nerved, stiff, nearly glabrous, very narrow, 5—7 mm. long, acuminate at the summit, more or less densely appressed to the stem. The upper leaves are slightly shorter and broader; the bracts are navicular and slightly scarious-margined. The stem, especially its upper parts, and the sepals are beset with scattered, short,

straight, and shining glandular hairs. Under the microscope these glandular hairs prove to consist of 2—4, generally 3 cylindrical cells, with an upper one round and secernent. The leaves are generally glabrous, or the upper ones scattered glandular-hairy. The petals are obovate, generally somewhat longer than the dark, distinctly 3-nerved, broadly lanceolate, nearly glabrous or slightly glandular-hairy sepals. The flower is about 8 mm. in diameter. The length of the pedicels is 2 to 4 times the length of the calyx.

This form I refer to subspecies *Gerardi* WILLD. f. *typica* WILLD. Spec. Pl. p. 2729; Regel, l. c. p. 224. *Alsine verna* et *nivalis* FENZL in Ledeb. Fl. Ross. I, p. 348. *Alsine Gerardi* REICHENB. Ic. Fl. Germ. V, tab. 208. *Alsine costata γ pulchella* BUNGE in LEDEB. Fl. Alt. II, p. 171.

In the Altaian, above the tree limit, in gravelly and stony places, with flowers at the end of July.

Distribution: Alpine tracts of Europe, Novaya Zemlya, arctic Siberia, the Altai, the Sayansk district, Baikal, Trans Baikal, northern Mongolia, the Caucasus, Russian Turkestan, the Thian Shan, North Africa, North America.

Alsine arctica (Stev.) Fenzl, Verbreit. *Alsin.* in Tab. Synopt. (1833) p. 18; Fenzl in Ledeb. Fl. Ross. I, p. 355; Turczan. Fl. Baical.-Dahur. (1842) p. 589, no. 226; Regel, Pl. Radd. (1862) p. 227, no. 303; Крыл. Фл. Алт. I (1901) p. 158. *Arenaria arctica* Stev. in DC. Prodrom. I, p. 404; Bunge, Enum. Alt. p. 24; Turczan. Cat. Baical. no. 255.

Fig. 85. *Alsine arctica* STEV. subspec. *scapigera* REGEL (1/1).

subspec. **scapigera** Regel, l. c.

All of the specimens collected, the stems of which vary from 3 to 6 cm. in length, belong to the large-flowered form, entered by HOOKER, Fl. Bor. Am. I, as var. *grandiflora*. The length of the petals varies from 10 to 12 mm., being thus one and a half to twice as long as the calyx. Of rather common occurrence in the Altaian, at an altitude of about 1900 m. above sea-level, in somewhat moist places, among moss and the like. In full flower at the end of July.

Distribution: Novaya Zemlya, arctic Siberia, the eastern Altai, the Sayansk district, Baikal, Trans Baikal, arctic America.

Alsine biflora (L.) Wahlenb. Fl. Lappon. (1812) p. 128; Fenzl in Ledeb. Fl. Ross. I, p. 355; Regel, Pl. Radd. (1862) p. 229, no. 304. *Alsine occulta* Turczan. Fl. Baical.-Dahur. (1842) p. 590, no. 227; Крыл. Фл. Алт. I (1901) p. 158. *Arenaria arctica* Ledeb. Fl. Alt. II, p. 172. *Arenaria stenopetala* et *occulta* Turczan. Cat. Baical. no. 256 et 257.

The specimens belonging to this species, collected by me in the Altaian, are distinguished by having the stems rather coarse, rigid and erect, frequently slightly yellowish and ligneous below. The petals are to 1½ times as long as the calyx. Generally 2—3, rarely to 5-flowered. Partly done flowering and with ripe capsules at the end of July. The specimens seemed to agree perfectly with *α rigidula* FENZL, l. c.

Distribution: Arctic islands, arctic and alpine tracts of Europe, arctic Siberia from the Ural to Kamtchatka, the Altai- and Sayansk mountains, Baikal, North America.

Sagina procumbens L. Spec. Pl. ed. II (1762) p. 185; Ledeb. Fl. Alt. I, p. 155; Fenzl in Ledeb. Fl. Ross. I, p. 338; Regel, Pl. Radd. (1862) p. 305, no. 343; Крыл. Фл. Алт. I (1901) p. 155.

On dry hills at Kushabar, where, besides the typical form with 4 sepals and 4 petals, there also occur specimens with 5 sepals and petals, var. *pentamera* Gürke (in RICHTER-GÜRKE, Pl. Eur. II, p. 246), whereas forms are to be found containing or wanting distinct petals, *α corollina* et *β apetala* (in Ledeb. Fl. Ross. l. c.).

Flowering and with ripe fruits in the middle of July.

Distribution: Europe, the Caucasus, Tibet, temperate Asia to about Lake Baikal, North Africa, America, Greenland, Australia.

Agrostemma Githago L. Spec. Pl. ed. II (1762) p. 624; Крыл. Фл. Алт. I (1901) p. 153. *Githago segetum* Desf., Ledeb. Fl. Ross. I, p. 332. *Lychnis Agrostemma* DC., Ledeb. Fl. Alt. II, p. 184; Regel, Pl. Radd. (1861) p. 563. *Lychnis Githago* Scop. Fl. Carn. ed. II (1772) p. 310; Turczan. Cat. Baical. no. 232; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 162; Turczan. Fl. Baical.-Dahur. (1842) p. 581, no. 215.

Scattered in the tracts between Minusinsk and Kushabar as weeds in corn-fields, along road-sides, etc. Specimens taken in the fist half of July are in full flower.

Distribution: Europe, Caucasia, western Siberia, more rarely to be found in the eastern tracts, North Africa. Introduced into South Africa and North America.

Lychnis chalcedonica L. Spec. Pl. ed. II (1762) p. 625; Ledeb. Fl. Alt. II, p. 188; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 163; Ledeb. Fl. Ross. I, p. 330; Крыл. Фл. Алт. I (1901) p. 152.

In somewhat moist thicket of *Salix*, along the road, near Kushabar. In full flower in the middle of July.

Distribution: South-eastern Russia, and adjacent parts of Asia, southern Siberia, eastwards to the government of Yeniseisk.

Lychnis flos cuculi L. Spec. Pl. ed. II (1762) p. 625; Ledeb. Fl. Alt. II, p. 187; Turczan. Cat. Baical. no. 231; Ledeb. Fl. Ross. I, p. 330; Turczan. Fl. Baical.-Dahur. (1842) p. 582, no. 216; Крыл. Фл. Алт. I (1901) p. 152.

This species I have found scattered in moist grass-field and in moist, open thicket of foliferous trees, near the road between Karatus and Kushabar. With flowers in July.

Distribution: Europe, the Caucasus, southern Siberia to towards Lake Baikal. In the most eastern area the species seemed to be very rare.

Lychnis sibirica L. Spec. Pl. ed. II (1762) p. 626; Turczan. Cat. Baical. no. 230; Ledeb. Fl. Ross. I, p. 331; Turczan. Fl. Baical.-Dahur. (1842) p. 583, no. 219; Regel, Pl. Radd. (1861) p. 577; Крыл. Фл. Алт. I (1901) p. 153.

On sandy and stony declivities, near Ust Abakansk, on the right side of the river, growing together with *Potentilla subacaulis*, and on declivities, near the Dora Steppe. In full flower at the beginning of June.

Distribution: Dispersed through Siberia from the Ural to the Amoor Province, northern Mongolia.

Melandryum album (Mill.) Rupr. Fl. Ingr. (1860) p. 162. *Melandryum pratense* Roehl. Deutschl. Fl. ed. I (1796) p. 254; Ledeb. Fl. Ross. I, p. 327. *Lychnis arvensis* Schkuhr, Botan. Handb. I (1808) p. 403; Ledeb. Fl. Alt. II, p. 187. *Lychnis alba* Mill., Regel, Pl. Radd. (1861) p. 574. *Lychnis vespertina* Sibth. Fl. Oxon. (1794) p. 146; Turczan. Fl. Baical.-Dahur. (1842) p. 586, no. 223. *Lychnis dioica* L., Turczan. Cat. Baical. no. 229. *Lychnis pratensis* Spreng., Крыл. Фл. Алт. I (1901) p. 151.

Scattered in meadows and in thickets on the islets in the lower part of the river Abakan, near Ust Abakansk, and also in thicket, near Kushabar. Young flowers at the end of June.

Distribution: Europe, the Caucasus, Turkestan, through Siberia from the Ural to about Lake Baikal, Greenland, and North America (introduced).

Silene venosa (Gilib.) Aschers. Fl. Brand. Abt. II, Fl. Berol. (1859) p. 23. *Silene inflata* Smith, Fl. Brit. II (1800) p. 292; Ledeb. Fl. Alt. I, p. 138; Turczan. Cat. Baical. no. 217; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 149; Ledeb. Fl. Ross. I, p. 304; Turczan. Fl. Baical.-Dahur. (1842) p. 573, no. 206; Regel, Pl. Radd. (1861) p. 542; Rohrbach,

Monogr. Gat. *Silene* (1868) p. 85; Williams, Rev. Gen. *Silene* (1896) p. 47; Крыл. Фл. Алт. I (1901) p. 142.

Near Karatus, along the road, in dry, open foliferous copse wood. Flowering in the first half of July. The specimens are completely glabrous, the leaves narrow, lanceolate, the length 5—7 times the breadth, distinctly tapering towards the base, never cordate or rounded, glabrous, or nearly imperceptibly scabrous at the margin. The flowers are short-pedicelled and rather densely congested.

Distribution: Europe, Caucasia and south-western Asia to the Himalayas, the whole of Siberia from the Ural to the Amoor Province, Mongolia (till now not observed in China), Japan, North Africa, North America (introduced).

Silene repens Patrin. in Pers. Syn. Pl. I (1805) p. 500; Ledeb. Fl. Alt. II, p. 150; Bunge, Enum. Alt. p. 23; Turczan. Cat. Baical. no. 223; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 159; Ledeb. Fl. Ross. I, p. 308; Turczan. Fl. Baical.-Dahur. (1842) p. 579, no. 212; Regel, Pl. Radd. (1861) p. 560; Rohrbach, Monogr. Gat. *Silene* (1868) p. 206; Williams, Rev. Gen. *Silene* (1896) p. 161; Крыл. Фл. Алт. I (1901) p. 144.

In dry meadows and on rocky declivities between Karatus and Kushabar. In full flower in the first half of June. Near Ust Tara-kem, on rocky slopes, past flowering in the middle of August. The leaves in the specimens collected are on an average 3 mm. broad, and 35—40 mm. long; the calyx is tubular-campanulate or clavate, pink, densely villous, its teeth short. It is, therefore, probably identical with *γ angustifolia* Turczan. l. c.

Distribution: Central and eastern Russia, and adjoining portions of Asia through Trans Caspia and Turkestan, Siberia to Kamtchatka, northern Mongolia, China, Manchooria, Corea, Sakhalin, Japan.

Silene chlorantha Ehrh. Beitr. Naturk. VII (1792) p. 146; Ledeb. Fl. Alt. II, p. 145; Ledeb. Fl. Ross. I, p. 319 et 778; Rohrbach, Monogr. Gat. *Silene* (1868) p. 184; Williams, Rev. Gen. *Silene* (1896) p. 141; Крыл. Фл. Алт. I (1901) p. 148.

var. **glutinosa** *nov. var.*

Differt a specie typica internodiis superioribus zonis viscosis, fuconigris, 12—15 mm. latis instructis.

The specimens collected agree perfectly in their external habitus with the typical species, but differ by the 3 or 4 uppermost internodes under the flower cluster being furnished with a dark, brownish black, and glutinous zone, from 12 to 15 mm. broad. The calyx is of a characteristically pale, greyish green colour, completely glabrous, only the teeth being densely and finely ciliate. Collected in full flower in the first half of July, in grass-grown, dry thickets of fir, between Minusinsk and Kushabar.

Distribution: Middle, southern and eastern Europe, Caucasia and south-western Asia, southern Siberia, eastwards to about the Yenisei.

Silene Otites (L.) Smith, Fl. Brit. II (1800) p. 469; Ledeb. Fl. Alt. II, p. 140; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 151; Ledeb. Fl. Ross. I, p. 309; Крыл. Фл. Алт. I (1901)

p. 144; Rohrbach, Monogr. Gat. *Silene* (1868) p. 200; Williams, Rev. Gen. *Silene* (1896) p. 155. *Cucubalus Otites* L. Spec. Pl. ed. II (1762) p. 594.

subspec. **parviflora** (Ehrh.) Pers. Synops. Pl. I (1805) p. 497 (spec.) *Silene tenuis* in Bunge, Enum. Alt. p. 22.

This subspecies differs from the typical species, especially in its more vigorous growth, the stem, the pedicels and the calyces being densely villous. The petals at the base scattered puberulent. The specimens collected agree perfectly with material of comparison from middle Europe. On the Abakan Steppe, near Ust Kamuishto; collected in full flower in the middle of July, in dry, grass-grown places between Minusinsk and Kushabar.

Distribution: Middle and south-eastern Europe, Caucasia south-western Asia, Siberia, eastwards to about Yakutsk.

Silene tenuis Willd. Enum. Hort. Berol. (1810) p. 474; Turczan. Cat. Baical. no. 218 ex parte; Turczan. Fl. Baical.-Dahur. (1842) p. 577, no. 209; Rohrb. Monogr. Gat. *Silene* (1868) p. 186 ex parte; Williams, Rev. Gen. *Silene* (1896) p. 143 ex parte. *Silene stylosa β alpicola* Ledeb. Fl. Alt. II, p. 144. *Silene graminifolia* Otth., Ledeb. Fl. Ross. I, p. 307 ex parte *(α grandiflora);* Bunge, Enum. Alt. p. 22; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 154; Крыл. Фл. Алт. I (1901) p. 143 ex parte.

The species is much varying. The specimens collected have the stems 15—20 cm. long, generally tufted, of a yellowish green or brownish red colour, glabrous or slightly glutinous, with one or 2 pairs of leaves. The radical leaves are lanceolate to linear, glabrous, slightly scabrous at the margin. The flowers comparatively few, but rather densely congested, large, erect, spreading, or drooping. The calyx about 15 mm. long, much inflated, its teeth more or less obtuse or rounded at the apex, finely and slightly ciliate. The petals large, much protruding, deeply 2-cleft, the claws very slightly ciliate.

Of rather common occurrence in the Altaian, above the tree limit, at an altitude of about 2000 m. above sea-level, in grass-grown, frequently stony places, partly together with *Moehringia lateriflora.* In full flower in the second half of July.

Distribution: Arctic portions of Siberia, eastwards as far as Behring's Ocean, the Altai- and Sayansk regions, and eastwards through Trans Baikal to the Amoor Province, Mongolia, Tibet, the north-western Himalayas.

Silene Jenisea Steph. in Herb. ex Bunge, Suppl. Fl. Alt. p. 554; Turczan. Fl. Baical.-Dahur. (1842) p. 574, no. 207. *Silene tenuis* Turczan. Cat. Baical. no. 218 ex parte; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 155. *Silene chamarensis* Turczan. Cat. Baical. no. 222; Turczan. Fl. Baical.-Dahur. (1842) p. 578, no. 211. *Silene ambigua* Turczan. Fl. Baical.-Dahur. (1842) p. 576, no. 208. *Silene tenuis* Willd. b *Jenisea* Rohrb. Monogr. Gat. *Silene* (1868) p. 187 ex parte; Williams, Rev. Gen. *Silene* (1896) p. 143 ex parte. *Silene graminifolia* Otth., Ledeb. Fl. Ross. I, p. 307 pro parte. *Silene stylosa α rupicola* Ledeb. Fl. Alt. II, p. 144.

Fig. 86. *Silene tenuis* WILLD. (1/1).

This species is, like the preceding one, rather varying, approaching it systematically rather closely, and is by some authors, LEDEBOUR, REGEL and others, considered as a variety, or even confounded with it. In my opinion, however, these two species are so different, not only in external habitus and several other less conspicuous characters, as it will appear from the descriptions, but they are also distinct in point of geographical range. The former is chiefly confined to arctic and alpine tracts, and the latter — at any rate to judge from my own experience — rather a plant of the lowlands and the steppes. I have therefore found it right to enter them as two different species, applying to the latter of these STEPHAN'S name, in spite of his having given no description of it himself.

Fig. 87. *Silene Jenisea* STEPH. (1/1).

The specimens collected are 15—40 cm. high, glabrous. The leaves are very narrow, linear or nearly filiform, glabrous, distinctly pointed at the summit. The flowers are smaller, frequently rather numerous, erect. The calyx 10—12 mm. long, narrower, less inflated, with prominent nerves, and longer and more acute teeth, which are distinctly ciliate. The petals rather short, only sligthly longer than the calyx; the claws are glabrous.

Collected in gravelly, dry places in the lowland on the river Abakan, near Ust Kamuishto. In full flower in the second half of June.

Distribution: The Altai- and Sayansk region, eastwards through Trans Baikal to the Amoor Province and Manchooria, Mongolia.

Cypsophila Gmelini Bunge in Ledeb. Fl. Alt. II, p. 128; Turczan. Cat. Baical. no. 214; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 139 (α); Turczan. Fl. Baical.-Dahur. (1842) p. 570, no. 205; Крыл. Фл. Алт. I (1901) p. 138. *Gypsophila Gmelini* α *angustifolia* et *Gypsophila davurica* β *angustifolia* Fenzl in

Ledeb. Fl. Ross. II, p. 294. *Gypsophila acutifolia* Fisch. *β Gmelini* (Bunge) Regel, Pl. Radd. (1861) p. 536, no. 279.

The specimens collected of this very polymorphous species, are distinguished by having the stems about 20 cm. high, and, as the whole plant for the rest, completely glabrous. The lower leaves are about 3 cm. long, and 1 mm. broad, i. e. of the same breadth as the stem, linear, more or less recurved, equally broad throughout their length, tapering and subobtuse at the summit, never mucronate. The lower leaves are of the same length as the internodes, the upper ones gradually shorter, subulate, ½—⅓ of the length of the internodes. The flower cluster rather few-flowered, the bracts and bractlets minute, only few mm. long, membranous, with a more or less distinct midrib projected into a greenish or brownish point. The calyx is about 3 mm. long, campanulate, with 5 distinct nerves, of a brownish green colour, its teeth triangular, acute, finely and shortly ciliate. The petals are slightly lilac, 6 mm. long. The specimens are, moreover, characteristic in having the stems, especially in their lower parts, slightly geniculate in the nodes, and are here, at any rate when dried, very fragile, and easily broken.

Scattered on the Abakan Steppe about the Lower Abakan, especially on the dry, hot Devonian sandstone declivities, where I have collected them with flower-buds and young flowers at the end of June.

Distribution: South-eastern Russia (the government of Orenburg), southern Siberia, eastwards to about the government of Yakutsk, northern Mongolia.

Dianthus chinensis L. Spec. Pl. ed. II (1762) p. 588; Rohrb. in «Linnaea» vol. 36, p. 670 (as *Dianthus sinensis). Dianthus Seguieri* Chaix in Villars, Hist. Pl. Dauph. I (1786) p. 333 et III (1789) p. 594; Ledeb. Fl. Ross. I, p. 277; Regel, Pl. Radd. (1861) p. 523; Крыл. Фл. Алт. I (1901) p. 133. *Dianthus dentosus* Fisch., Ledeb. Fl. Alt. II, p. 134; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 144. *Dianthus versicolor* Fisch., Turczan. Cat. Baical. no. 215; Turczan. Fl. Baical.-Dahur. (1842) p. 567, no. 202; Williams, Monogr. Gen. *Dianthus* in Linn. Soc. Journ. Bot. vol. XXIX, p. 429 (as *Dianthus sinensis).*

The specimens collected of this widely distributed and polymorphous species, are distinguished by having the stems 20—30 cm. high, erect, or sometimes slightly curved and ascending at the base, densely hirsute. The leaves are linear, 2—4 cm. long, the broadest towards 3 mm. broad, 1-nerved, or rarely with 2 faint lateral nerves, gradually acuminate towards the apex, horizontally spreading, or more or less distinctly bent upwards, rough, especially underneath and along the margin 1- to few-flowered; the calyx-scales are bent upwards, the outer ones about ¼ shorter than the calyx itself, consisting in the lowest part of a short, broad lamina, while their upper two thirds are very narrow and subulate, the inner scales are comparatively broader, and with shorter points, which are only about half the total length of the scale itself; the inner scales are also shorter than the outer ones, ⅓ to ½ of the length of the calyx itself. The scales are glabrous, or only very slightly scabrous. The calyx is 15—17 mm. long, nearly glabrous, or only slightly scabrous, very distinctly striped, its upper ⅓—¼

divided into triangular teeth, the margin of which is finely, but distinctly ciliate. The petals are red, their total length about 25 mm., the length of the blade mounting to 1 cm., sharply and distinctly crenate at the margin. Dry meadows on the steppes on the river Abakan, near Ust Kamuishto, where beginning to flower in the second half of June; nearly past flowering at the beginning of August, in open, dry, sandy woods of larch and pine, near Ust Sisti-kem, and at Ust Kamsara.

Distribution: Middle and south-western Europe, Caucasia, Turkestan to western Tibet, throughout Siberia, excepting the most northern portions, northern Mongolia, Manchooria, northern China, Corea.

· **Dianthus superbus** L. Amoen. Acad. IV (1759) p. 272; Ledeb. Fl. Alt. II, p. 137; Turczan. Cat. Baical. no. 216; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 148; Ledeb. Fl. Ross. I, p. 285; Turczan. Fl. Baical.-Dahur. (1842) p. 568, no. 203; Regel, Pl. Radd. (1861) p. 533, no. 227; Rohrb. in «Linnaea», vol. 36, p. 636; Williams, Monogr. Gen. *Dianthus* p. 411; Крыл. Фл. Алт. I (1901) p. 134.

Common on the sandy banks of rivers along the Upper Amyl, in subalpine wooded tracts, from Petropawlowsk to Kalna, and along the banks of the river Sisti-kem. Collected in full flower in the middle of July. The specimens are rather vigorous and well-grown, with stems to 70 cm. high, rather flowery, from 2—7 flowers. The calyx is comparatively long, to 32 mm., and about 5 mm. broad, frequently of a reddish or bluish colour, glabrous, and finely striped. The calyx-scales rather short, the inner ones about 1 cm. long, broadest near the apex, where suddenly contracted into a short sting, to about 1 mm. long, the outer ones only about 6 mm. long, of about the same shape as the inner ones. The calyx-scales are glabrous, only the teeth being sometimes slightly ciliate. The petals are of a bluish red colour, about 4 mm. in diameter. The leaves are to 7 cm. long and 6 mm. broad, generally about 4—5 cm. long, and 3—4 mm. broad, flat, glabrous, slightly scabrous only along the margin, gradually acuminate towards the summit.

Distribution: Northern and middle Europe, Caucasia, Turkestan, (the Thian Shan), southern Siberia, from the Altai eastwards to Trans Baikal, Mongolia, Manchooria, northern China, northern Corea, Sakhalin, Japan.

Nymphaeaceae DC.

Nymphaea candida Presl in Rostlinar (1821) p. 10; Caspary, Nymph. Skand. in Bot. Not. (1879) p. 71; Крыл. Фл. Алт. I (1901) p. 49. *Nymphaea alba* L., Turczan. Cat. Baical. no. 87 (excl. syn.); Karel. et Kiril. Enum. Pl. Fl. Alt. no. 49; Ledeb. Fl. Ross. I, p. 83. *Nymphaea alba* L. subspec. *candida* (Presl) Korshinsky, Фл. Востока Европ. Россіи I, p. 130. *Nymphaea pauciradiata* Bunge in Ledeb. Fl. Alt. II, p. 272; Ledeb. Fl. Ross. I, p. 84. *Nymphaea Basniniana* Turczan. Fl. Baical.-Dahur. (1842) p. 93, no. 84.

In a pond by the road between Karatus and Kushabar, flowering about the middle of July. The typical *Nymphaea alba* has not as yet been met with in Siberia.

Distribution: Northern and middle Europe, Turkestan, southern Siberia, eastwards to Lake Baikal.

Nymphaea pygmaea Ait. Hort. Kew. ed. II, vol. III (1811) p. 293; Turczan. Cat. Baical. no. 88; Ledeb. Fl. Ross. I, p. 84; Turczan. Fl. Baical.-Dahur. (1842) p. 93, no. 85; Крыл. Фл. Алт. I (1901) p. 49. *Nymphaea tetragona* Georgi, Bemerk. Reise Russ. Reich. I (1775) p. 220. *Nymphaea alba* subspec. *tetragona* (Georgi) Korshinsky, Фл. Востока Европ. России I, p. 133.

In swamps near Ust Tara-kem, on the Upper Bei-kem. Done flowering in the second half of August.

Distribution: From eastern Russia (the government of Perm) through southern Siberia, eastwards to Manchooria and the Amoor Province, China, Sakhalin, and the Himalayas.

Ranunculaceae JUSS.

Atragene sibirica L. Spec. Pl. ed. I (1753) p. 343. *Atragene alpina β* in Ledeb. Fl. Alt. II, p. 377; Turczan. Cat. Baical. no. 2; Ledeb. Fl. Ross. I, p. 4; Turczan. Fl. Baical.-Dahur. (1842) p. 25, no. 2. *Atragene alpina* var. *sibirica* (L.) Regel et Til. Fl. Ajan. p. 23, no. 2; Regel, Pl. Radd. (1861) p. 9; Крыл. Фл. Алт. I (1901) p. 5.

In thickets on the river Abakan, and on the Amyl. near Petropawlowsk, very common in thickets on the banks of the Lower Sisti-kem and on the Bei-kem, where frequently associated with *Ribes pubescens*. Specimens taken in the first half of August, are nearly past flowering, and with ripe fruits.

Distribution: Norway (WILLE 1917), eastern Finland, northern and middle Russia, the Ural, Siberia, eastwards to the Khingan Mountains, and in the Yenisei valley, northwards up to 70° north latitude, northern Mongolia, Turkestan.

Thalictrum petaloideum L. Spec. Pl. ed. II (1762) p. 771; Ledeb. Fl. Alt. II, p. 345; Turczan. Cat. Baical. no. 6; Ledeb. Fl. Ross. I, p. 6; Turczan. Fl. Baical.-Dahur. (1842) p. 29, no. 7; Regel, Uebers. Gatt. *Thalictrum* in Bull. Soc. Nat. Moscou (1861, I) p. 28; Lecoyer, Monogr. Gen. *Thalictrum* in Bull. Soc. Roy. Bot. Belgique (1885) p. 165; Regel, Pl. Radd. (1861) p. 12; Крыл. Фл. Алт. I (1901) p. 7.

On dry, hot Devonian slopes of sandstone, with a southern aspect, on the Abakan Steppe, near Ust Kamuishto, where collected by me with flowers and ripe fruits in the middle of June.

Distribution: Southern Siberia, from the Altai eastwards to Trans Baikal, northern Mongolia, northern China, Corea.

Thalictrum foetidum L. Spec. Pl. ed. II (1762) p. 768; Ledeb. Fl. Alt. II, p. 349; Turczan. Cat. Baical. no. 8; Ledeb. Fl. Ross. I, p. 7; Turczan. Fl. Baical.-Dahur. (1842) p. 30, no. 8; Regel, Uebers. Gatt. *Thalictrum* (1861) p. 44; Regel, Pl. Radd. (1861) p. 13;

Lecoyer, Monogr. Gen. *Thalictrum* (1885) p. 181; Крыл. Фл. Алт. I (1901) p. 8. *Thalictrum sibiricum* Pallas, Reise Russ. Reiches I (1771) p. 219. *Thalictrum acutilobum* DC., Ledeb. Fl. Alt. II, p. 349; Turczan. Cat. Baical. no. 9.

subspec. **genuinum** Regel (1861) l. c. var. α in Ledeb. Fl. Ross. I, p. 7.

In the specimens collected the whole plant is densely puberulent, the upper as well as the under side of the leaves, the stem, pedicels and fruits as well. The leaves are deeply indented, with acute lobes. On the Abakan Steppe, at Ust Kamuishto, on dry, sloping cliffs, and in dry, sandy places, nearly past flowering and with ripe fruits in the second half of June.

Distribution: Mountain regions of middle Europe, from the Pyrenees through the Alps, the Apennines to the Caucasus, Asia Minor, south-western Asia to the Himalayas, Siberia (except the Amoor Province), northern Mongolia.

Thalictrum minus L. Spec. Pl. ed. II (1763) p. 769; Ledeb. Fl. Ross. I, p. 8; Turczan. Fl. Baical.-Dahur. (1842) p. 31, no. 9; Regel, Uebers. Gatt. *Thalictrum* (1861) p. 31; Lecoyer, Monogr. Gen. *Thalictrum* (1885) p. 199; Крыл. Фл. Алт. I (1901) p. 8. *Thalictrum elatum* Ledeb. Fl. Alt. II, p. 350; Turczan. Fl. Baical.-Dahur. (1842) p. 32, no. 10; Regel, Pl. Radd. (1861) p. 13, no. 14 et 15. *Thalictrum mucronatum* Ledeb. Fl. Ross. I, p. 8. *Thalictrum majus* Jacq., Ledeb. Fl. Alt. II, p. 351; Ledeb. Fl. Ross. I, p. 8; Turczan. Fl. Baical.-Dahur. (1842) p. 32, no. 11. *Thalictrum flavo-virens* Ledeb. Fl. Ross. I, p. 9. *Thalictrum appendiculatum* C. A. Meyer, Ledeb. Fl. Alt. II, p. 356. *Thalictrum collinum* Wallr., Ledeb. Fl. Ross. I, p. 11.

An exceedingly variable species — entered by Lecoyer, l. c. (1885) p. 293 with no less than 210 synonyms — of very common occurrence on the islets in the river Abakan, especially in the luxuriant natural meadows, where constituting one of the most characteristic plants. A very luxuriant form, of a deep green colour, is to be found in the said localities, with stems considerably exceeding 1 m. in height, attaining from 6 to 7 mm. in diameter at the root. The stems are of a green or yellowish colour, round, hollow, mostly deeply striate, more or less geniculate at the nodes, generally with leafless sheaths at the base, in the upper part, from about the middle, rather much branched, with spreading branches. The stem, like the whole plant as well, is completely glabrous. The leaves are triternate, the lower ones long-petioled, the upper ones sessile, all of them generally with brownish, membranous stipule like appendages at the base. The lower leaves are to 25 cm. long, and 18 cm. broad, the outline being triangular, or ovate. The shape and incision of the leaflets are very variable, their length up to towards 2 cm., of a rather light colour on the under side, with prominent nerves, the margin involute, and the summit 3 or 5-lobed, sometimes doubly lobed. The leaflets have generally short petioles, or are sometimes sessile as well. The panicle is rather large, with spreading branches, and rather few flowers, but the floweriness is, on the whole, somewhat varying. During the flowering the flowers are more or less drooping, on pedicels from 0,5 cm. to 1,5 cm. long. The sepals are narrowly ovate to lanceolate, 3 or 5-

nerved, of a pallid reddish violet colour, deciduous early in season. The anthers are yellow, over 2 mm. long, with a pointed summit, pendent, on capillaceous filaments, to 5 mm. long. The lower bracts are foliaceous, gradually decreasing in size upwards. The upper ones are linear, nearly membranous, entire, or sometimes slightly toothed at the base. The species begins flowering at the end of June; none of the plants in my collections taken at the end of June, bearing ripe fruits.

Distribution: Nearly all over Europe, in Asia from the Ural to Japan, northwards to about the limit of conifers, southwards through Mongolia, northern China, northern Corea, Africa, North America (Unalashka).

Thalictrum simplex L. Mantissa p. 78; Ledeb. Fl. Alt. II, p. 353; Turczan. Cat. Baical. no. 15; Ledeb. Fl. Ross. I, p. 10; Turczan. Fl. Baical.-Dahur. (1842) p. 33, no. 13; Regel, Pl. Radd. (1861) p. 14; Regel, Uebers. Gatt. *Thalictrum* (1861) p. 51; Lecoyer, Monogr. Gen. *Thalictrum* (1885) p. 204; Крыл. Фл. Алт. I (1901) p. 9. *Thalictrum strictum, galioides et affine* Ledeb. Fl. Ross. I, p. 10. *Thalictrum exaltatum* C. A. Meyer in Ledeb. Fl. Alt. II, p. 352.

Very common in open grass-fields on the islets in the river Abakan, accompanying the preceding one. Specimens belonging to this species found by me, with stems attaining the height of a man, and markedly striate. The leaflets are very large, to 3,5 cm. long, and the breadth from ½ to ¼ the length, generally cuneately tapering towards the base, where they are rounded. The summit of the leaflets have acute, entire lobes. The upper leaves are always narrower than the lower ones. The leaves are of a dead green underneath, and the margin is sligthly recurved. The rootstock is fibrate, not markedly creeping. The leaf-sheaths are distinct stipulate at the base. The panicle is foliate, narrow, with few flowers. The specimens seemed to agree perfectly with Regel's diagnosis of subspecies *strictum* l. c. p. 53. (*Thalictrum strictum* L., Ledeb. Fl. Ross. I, p. 10; *Thalictrum exaltum* C. A. Meyer in Ledeb. Fl. Alt. II, p. 352). In my collections there are only specimens with young flower-buds belonging to this species, taken towards the end of June in several places on islets in the river Abakan. Its flowering season thus seemed to occur later than that of the preceding species.

A great many specimens belonging to indermediate forms, probably obtained by hybridization, accompanying the two last-mentioned, have been collected by me on the islets in the river Abakan. The leaves are bi-or tri-ternate. In the size and shape of the leaflets these specimens generally agree best with *Thalictrum simplex*, while, on the other hand, in the spreading and much branched panicle, they resemble more particularly the first-mentioned species. The floweriness varies rather considerably, and so does the vegetative shoot, sometimes approaching one, sometimes the other of these specimens. During the flowering the flowers are erect or drooping, and in the structure of each flower these specimens agree rather perfectly with *Thalictrum minus*, with which it also agrees as to the flowering season. The panicle is more or less foliate, which is a markedly intermediate character.

Distribution: *Thalictrum simplex* is distributed over the greater part of Europe, westwards to about the Rhine and the Rhone, south-western Asia, Siberia, Manchooria, northern and central China, Japan.

Anemone reflexa Stephan in Willd. Spec. Pl. II, p. 1282; Turczan. Cat. Baical. no. 24; Ledeb. Fl. Ross. I, p. 14 et 728; Turczan. Fl. Baical.-Dahur. (1842) p. 41, no. 22; Regel, Pl. Radd. (1861) p. 15; Крыл. Фл. Алт. I (1901) p. 12.

In shady and rather moist woods on the Upper Amyl, between Kushabar and Kalna, where I have found specimens past flowering in the middle of July.

Distribution: Through eastern Siberia from about the Yenisei to Kamtchatka, northern Mongolia, Manchooria, northern Corea.

Anemone altaica Fisch. in Herb.; Ledeb. Fl. Alt. II, p. 362; Ledeb. Fl. Ross. I, p. 16; Крыл. Фл. Алт. I (1901) p. 12.

Scattered in the taiga on the Upper Amyl, where collected with fruits about the middle of July.

Distribution: Eastern Russia, western Siberia, eastwards to about the Yenisei.

Anemone coerulea DC. Syst. Nat. I, p. 203; Ledeb. Fl. Alt. II, p. 359; Ledeb. Fl. Ross. I, p. 14; Крыл. Фл. Алт. I (1901) p. 11. *Anemone coerulea* DC. *β gracilis* Regel, Pl. Radd. (1861) p. 15.

In the subalpine taiga territory about the Upper Amyl, where past flowering in the middle of July.

Distribution: Siberia.

Anemone silvestris L. Spec. Pl. ed. II (1762) p. 761; Turczan. Cat. Baical. no. 25; Ledeb. Fl. Ross. I, p. 16 et 728; Turczan. Fl. Baical.-Dahur. (1842) p. 41, no. 23; Regel, Pl. Radd. (1861) p. 17; Крыл. Фл. Алт. I (1901) p. 13.

Very common in meadows and in thickets on the islets in the rivers Yenisei and Abakan as well as on banks of rivers, where, in the flowering season, in the second half of May and the first half of June, being one of the very prettiest and most characteristic plants. Frequently occurring here, associated with plants such as *Taraxacum*, *Androsaces septentrionale*, etc., here and there so abundantly as to give the whole meadow a white appearance. In the Urjankai country collected by me, on the Sisti-kem as well, in meadows in woods, with ripe fruits about the middle of August.

The Siberian specimens collected, are distinguished by their vigorous growth, with stems to 40 cm. high, with large flowers, to 7 cm. in diameter. The shape of the sepals nearly obovate, the margin even, or finely crenate. The shining white flowers very conspicuously turn to the sun, and turn in proportion as the day advances. The involucral leaves are long-petioled, 3-parted, each of the lateral segments generally deeply cleft into 2 narrow, lanceolate, nearly entire, or slightly toothed divisions. The middle one is generally 3-lobed, into one larger middle lobe and 2 shorter side-lobes, or it may

be entire as well, to 5 cm. long, and from 0,6 to 1 cm. broad. The lobes of the involucral leaves may also be simple, from linear to lanceolate, with the margin sligthly crenate. The basal leaves are long-petioled; the petioles to 20 cm. long. The lamina is 3-parted, and each of the side lobes deeply 2-cleft, of which the outer division is always somewhat smaller than the inner one. When superficially viewed, the leaf may thus appear to be 5-parted. The lobes of the leaf may again be more or less distinctly lobed, or deeply crenate, the middle lobe generally 3-or 5-lobed.

Here and there, over smaller stretches of about 1 m.², I have observed this species occurring with a deviating appearance, which may properly have to be regarded as abnormal individuals. Within such a small area all the specimens generally have the sepals reduced, only about 1 cm. long, herbaceously green, frequently with a reddish tarnish. The stamens and achenes in these individuals frequently seemed to be more or less reduced in growth too. The stems are also considerably shorter, generally from 10 to 15 cm. long. This abnormal form has been described by MARTJANOW as f. *viridiflora*. Similar abnormities, probably caused by attacks of micro-organisms, not unfrequently occur in *Anemone nemorosa* and other species belonging to this genus.

Distribution: Middle and southern Europe, Caucasia, south-western Asia, Siberia from the Ural to Kamtchatka and the Amoor Province, Mongolia, the Thian-Shan.

Anemone dichotoma L. Amoen. Acad. I (1749) p. 155; Ledeb. Fl. Alt. II, p. 365; Turczan. Cat. Baical. no. 26; Turczan. Fl. Baical.-Dahur. (1842) p. 42, no. 24; Regel, Pl. Radd. (1861) p. 17; Крыл. Фл. Алт. I (1901) p. 13. *Anemone pensilvanica* Ledeb. Fl. Ross. I, p. 17.

Only one specimen belonging to this species occurs in my collection, taken in a swampy thicket, near Kushabar. Nearly past flowering about the middle of July.

Distribution: Throughout Siberia, from the Ural to the Amoor Province, northwards to 61° north latitude, Manchooria, northern Corea.

Anemone narcissiflora L. Spec. Pl. ed. II (1762) p. 763; Ledeb. Fl. Alt. II, p. 366; Turczan. Cat. Baical. no. 27; Ledeb. Fl. Ross. I, p. 18; Turczan. Fl. Baical.-Dahur. (1842) p. 43, no. 25; Regel, Pl. Radd. (1861) p. 17; Крыл. Фл. Алт. I (1901) p. 13.

This species is rather varying in Asia. The specimens gathered, have stems generally from 22 to 25 cm. high, furrowed, and like the leaves and the petioles, rather densely villous. The flowers are but rarely solitary, generally 4 in an umbel. The pedicels are comparatively long, to 5 cm. long, accordingly from 4 to 5 times the length of the sepals, being 1 to 1,5 cm. long (*γ monantha* DC. Prodrom. I, p. 22; *β* in LEDEB Fl. Ross. l. c.; REGEL, l. c.). The achenes are glabrous, of a faint, shining black. This species has been collected by me in the Altaian, about the limit of tree vegetation, at altitudes of about 1800 m. above sea-level, in grass-grown places, in flower and partly past flowering at the end of July.

Distribution: Southern and middle Europe, Caucasia, Turkestan, the Himalayas,

Siberia, from the Ural through the Altai, the Sayansk and Trans Baikal districts, northern and eastern Mongolia, northern China, North America.

Pulsatilla patens Miller, Dict. no. 4; Ledeb. Fl. Alt. II, p. 368; Turczan. Cat. Baical. no. 17; Ledeb. Fl. Ross. I, p. 19; Turczan. Fl. Baical.-Dahur. (1842) p. 35, no. 16; Regel, Pl. Radd. (1861) p. 20; Крыл. Фл. Алт. I (1901) p. 14.

Scattered on declivities, near the Amyl. Past flowering in the middle of July.

Distribution: Middle Europe, Siberia, northern Mongolia, North America.

Pulsatilla vulgaris Miller, Dict. no. 1; Ledeb. Fl. Alt. II, p. 369; Turczan. Cat. Baical. no. 18; Ledeb. Fl. Ross. I, p. 21; Turczan. Fl. Baical.-Dahur. (1842) p. 37, no. 18; Regel, Pl. Radd. (1861) p. 24; Крыл. Фл. Алт. I (1901) p. 15. *Pulsatilla Bungeana* Turczan. Cat. Baical. no. 21.

Only some specimens of this one found by me on the sandy banks of the river Abakan, near Ust Kamuishto. With ripe fruits at the end of June. The segments of the leaves are linear, from 1—2 mm. broad, acute at the summit. The outline of the leaves triangular to ovate.

Distribution: Europe, except middle and eastern Russia, Siberia, Mongolia, northern Tibet.

Callianthemum rutaefolium (L.) C. A. Meyer in Ledeb. Fl. Alt. II, p. 336; Turczan. Cat. Baical. no. 50; Ledeb. Fl. Ross. I, p. 48; Turczan. Fl. Baical.-Dahur. (1842) p. 45, no. 28; Regel, Pl. Radd. (1861) p. 51; Крыл. Фл. Алт. I (1901) p. 32. *Callianthemum coriandrifolium* Reichenb. Fl. German. Excurs. (1832) p. 727; Witasek, Art. Gatt. *Callianthemum* in Verh. d. K. K. Zool.-Botan. Ges. Wien XLIX (1899) p. 331.

The rather numerous specimens collected by me, have always unbranched, one-flowered stems, from 12 to 20 cm. high. The pinnae of the leaves are always markedly petioled, the length of the petioles in the lower pinnae generally 5 mm., in the upper ones generally somewhat shorter. The outline of the pinnae is roundly ovate, and rather deeply incised into nearly linear lobes, from 1 to 2 mm. broad, subobtuse or slightly subacute at the top. The lower pinnae generally tripartite. The stem bears a sessile, triparted leaf above the middle, more rarely 2-leaved, of which the lower leaf is always petioled. The sepals are nearly ovate, 7 to 8 mm. long, the petals narrowly obovate, 12 to 14 mm. long, broadly rounded at the top, tapering towards the base, where furnished with an orange-coloured spot. The whole plant is of a dull, yellowish colour.

Rather common in the Altaian, in moist, gravelly places, at altitudes of about 2100 m. above sea-level, in full flower at the end of July.

Distribution: Southern and middle Europe (the Alps), Russian Turkestan, the Thian-Shan, the Altai, the Sayansk district, the Yablonoi.

Ranunculus sceleratus L. Spec. Pl. ed. II (1762) p. 776; Ledeb. Fl. Alt. II, p. 327; Turczan. Cat. Baical. no. 43; Ledeb. Fl. Ross. I, p. 45; Turczan. Fl. Baical.-Dahur. (1842) p. 56, no. 41; Regel, Pl. Radd. (1861) p. 50; Крыл. Фл. Алт. I (1901) p. 31.

On the banks of the river Kamuishto, about 1 werst above its mouth, near a Tatarian burial ground, on swampy borders of lakes, near Uzuik, about Kushabar, and in swamps at Ust Tara-kem. Taken with flowers and ripe fruits in the second half of June and in July. All of the specimens collected are distinguished by having the receptacle beset with rather long, scattered, spreading, rather stiff hairs. In Norwegian specimens as well, I have found the receptacle to be furnished with a few scattered hairs, whereas a completely glabrous receptacle seemed to be most frequent here. In American specimens I have also observed hairy receptacles.

Distribution: Europe, except Portugal and the Balkan Peninsula, temperate and subtropical regions of Asia, North Africa, North America.

Ranunculus repens L. Spec. Pl. ed. II (1762) p. 779; Ledeb. Fl. Alt. II, p. 329; Turczan. Cat. Baical. no. 49; Ledeb. Fl. Ross. I, p. 43; Turczan. Fl. Baical.-Dahur. (1842) p. 58, no. 45; Regel, Pl. Radd. (1861) p. 50; Крыл. Фл. Алт. I (1901) p. 30.

Very common in the regions about the river Abakan, at Minusinsk, Kushabar, Kalna, Ust Algiac, and Ust Sisti-kem, where to be found flowering all the summer. Occurring especially in moist grass-fields, and is very common along banks of rivers, etc. It appears from the specimens collected that the species is much varying as to luxuriance, density of the hairiness, breadth of the sections of the leaves, etc. In humid habitats the species is mostly glabrous, in drier situations more densely pubescent. Both the forms described by Regel, l. c. f. *tenuisecta* and f. *pusilla* occur, with a great variety of intermediate forms. Near Askys I have found a form, nearly completely glabrous, and with remarkably narrow sections of leaves, decidedly pointing upwards (f. *gracilis* Norm.).

Distribution: All over Europe, south-western Asia, northern Persia, wooded regions of Siberia to the Sea of Okhotsk, northern Mongolia, China, Japan, Sakhalin, North America (introduced?).

Ranunculus reptans L. Spec. Pl. ed. II (1762) p. 773; Ledeb. Fl. Alt. II, p. 310; Turczan. Cat. Baical. no. 32; Крыл. Фл. Алт. I (1901) p. 23. *Ranunculus Flammula* L. γ Ledeb. Fl. Ross. I, p. 32. *Ranunculus Flammula* β *reptans* Turczan. Fl. Baical.-Dahur. (1842) p. 50, no. 32. *Ranunculus Flammula* var. *filiformis* Regel, Pl. Radd. (1861) p. 41.

On moist river-banks on islets in the rivers Yenisei and Abakan, where collected flowering in June, and at Ust Sisti-kem.

Distribution: Northern and middle Europe, Siberia, Manchooria, North America, Greenland.

Ranunculus polyanthemos L. Spec. Pl. ed. II (1762) p. 779; Ledeb. Fl. Alt. II, p. 328; Turczan. Cat. Baical. no. 48; Ledeb. Fl. Ross. I, p. 41; Turczan. Fl. Baical.-Dahur. (1842) p. 58, no. 44; Regel, Pl. Radd. (1861) p. 49; Крыл. Фл. Алт. I (1901) p. 30.

In meadows on islets in the rivers Yenisei and Abakan, in grass-grown places at Ust Kamuishto and about Kushabar. In full flower in the second half of June.

Distribution: Europe, Caucasia, Russian Turkestan, Siberia, eastwards to about Lake Baikal.

Ranunculus acris L. Spec. Pl. ed. II (1762) p. 779; Ledeb. Fl. Alt. II, p. 331; Turczan. Cat. Baical. no. 47; Ledeb. Fl. Ross. I, p. 40; Turczan. Fl. Baical.-Dahur. (1842) p. 60, no. 47; Regel, Pl. Radd. (1861) p. 48; Крыл. Фл. Алт. I (1901) p. 29.

On the islets in the rivers Yenisei and Abakan this species is very common, and occurs in different forms. Forms are to be found here recalling much f. *Friesii* Gr. et Good., f. *velutinus* Lindbl., f. *californicus* Benth., and intermediates between these. Whether the specimens be quite identical with the said forms, I dare not assert with absolute certainty, my material being too scarce. The species is also very common in the Urjankai country. On the banks of the Bei-kem, near Utinski porog, in grassy places, near the river, I have collected a very low form, with stems, only 5—10 cm. high, with 1 or 2 flowers, and which seemed to be identical with f. *pumilus* Wahlenb.

subspec. **Stevenii** Andrz. in Besser, Enum. Pl. Volh. (1822) p. 22; Ledeb. Fl. Ross. I, p. 41; Крыл. l. c. *Ranunculus propinquus* C. A. Meyer in Ledeb. Fl. Alt. II, p. 332; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 31; Ledeb. Fl. Ross. I, p. 40 et 732.

In dry fields about Ust Abakansk, near the river, and in the taiga about the Upper Amyl. In full flower at the end of June.

Distribution: The species is distributed all over Europe, south-western Asia, Siberia, Mongolia, the Himalayas, China, Japan, Sakhalin, North America.

Ranunculus auricomus L. Spec. Pl. ed. II (1762) p. 775; Ledeb. Fl. Alt. II p. 318 (excl. var. β); Turczan. Cat. Baical. no. 40; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 22; Ledeb. Fl. Ross. I, p. 38; Turczan. Fl. Baical.-Dahur. (1842) p. 55, no. 39; Regel, Pl. Radd. (1861) p. 47; Крыл. Фл. Алт. I (1901) p. 28.

subspec. **sibiricus** Glehn in Act. Hort. Petropol. IV, p. 16.

This one constitutes, in many respects, an intermediate between the typical *R. auricomus* and *R. cassubicus*, and is, in preference, distributed in the eastern geographical area of the species.

In humid, grass-grown places, in thickets on the road between Minusinsk and Kushabar, and on the river Amyl. In flower in the middle of July.

Distribution: The species is distributed over Europe, Caucasia, Siberia, Manchooria, the Thian-Shan, and the Himalayas.

Ranunculus frigidus Willd. Spec. Pl. ed. II, p. 1312; Turczan. Cat. Baical. no. 44; Regel, Pl. Radd. (1861) p. 46; Крыл. Фл. Алт. I (1901) p. 27. *Ranunculus altaicus* Laxm. in Nov. Comm. Acad. Petropol. XVIII, p. 533; Ledeb. Fl. Alt. II, p. 325; Ledeb. Fl. Ross. I, p. 37; Turczan. Fl. Baical.-Dahur. (1842) p. 57, no. 42. *Ranunculus fraternus* Schrenck, Ledeb. Fl. Ross. I, p. 731.

Frequent in the Altaian, at altitudes of about 2000 m. above sea-level, especially on moist and cool declivities, with a northern aspect, among moss etc., near the melting

snow. In full flower at the end of July. The specimens collected are large and luxuriant, the stems to 18 cm. high, with 1 to 3 cauline leaves, the breadth of the basal leaves to 3,5 cm., the flower from 2 to 2,5 cm. in diameter.

Distribution: Arctic Europe, arctic and alpine portions of Siberia, northern Mongolia, the Thian-Shan, North America.

Ranunculus radicans C. A. Meyer in Ledeb. Fl. Alt. II, p. 316; Turczan. Cat. Baical. no. 36; Ledeb. Fl. Ross. I, p. 34; Turczan. Fl. Baical.-Dahur. (1842) p. 52, no. 35; Regel, Pl. Radd. (1861) p. 44; Крыл. Фл. Алт. I (1901) p. 25. *Ranunculus Purschii* Hooker, Fl. Bor. Amer. I, p. 15; Ledeb. Fl. Ross. I, p. 35; Turczan. Fl. Baical.-Dahur. (1842) p. 54, no. 38.

subspec. **multifidus** Pursch, Regel, Pl. Radd. (1861) p. 45; Крыл. l. c. p. 26. *Ranunculus Purschii α aquatilis* a et b, Ledeb. Fl. Ross. I, p. 35.

There are only a few, rather defective specimens in my collection, taken in a pool in a peat-bog, near Ust Algiac, on the right bank of the river Sisti-kem, where associated with various species of *Sphagnum, Carex limosa,* and *Carex magellanica.* The leaves in the specimens collected are palmately divided into 3—5 segments, and each one generally divided into capillary sections. The outline of the leaves is nearly reniform, from 7 to 9 mm. broad, and the sections 0,5 to 1 mm. broad. The petals are, during the flowering, rather much reflexed, narrowly elliptic to broadly lanceolate, from 1,5 to 2 mm. broad, and from 3,5 to 4 mm. long. Floating leaves are wanting. Taken in full flower at the beginning of August.

Distribution: North-eastern Russia, the Thian-Shan, Siberia, northern Mongolia (the Altai and Sayansk mountains), North America.

Ranunculus subsimilis nov. spec. [Tab. VI, Fig. 1].

In Asia, the so-called *Ranunculus Cymbalaria* Pursch is recorded to be distributed from Persia through Turkestan and southern Siberia to Kamtchatka, the Himalayas and India. I have also collected a rather rich material from the Minusinsk district. By comparing my material with the drawing of the species found in Britton and Brown, An Illustr. Flora of Northern United States and Canada, Vol. II (1897) p. 86, I discovered at once a striking difference in the structure of the leaves. Prof. dr. N. Wille has most obligingly given me an opportunity of comparing the rather rich material of this species from various places in Siberia and America belonging to the Botanical Museum of the University at Christiania. In the material thus brought together I have been able to point out a marked difference between the Siberian specimens and the American ones in the structure of the leaves, which will also appear distinctly from the annexed figure 88. In the three upper rows I have grouped and reproduced in natural size leaves of the typical *Ranunculus Cymbalaria* Pursch, in the three lower ones leaves of Siberian specimens. The American specimens will be seen to be distinguished by having the leaves cordate-ovate to orbicular-reniform, with a broad, rounded summit, and with a distinct, cordiform incision at the base. The indentations of the leaves are

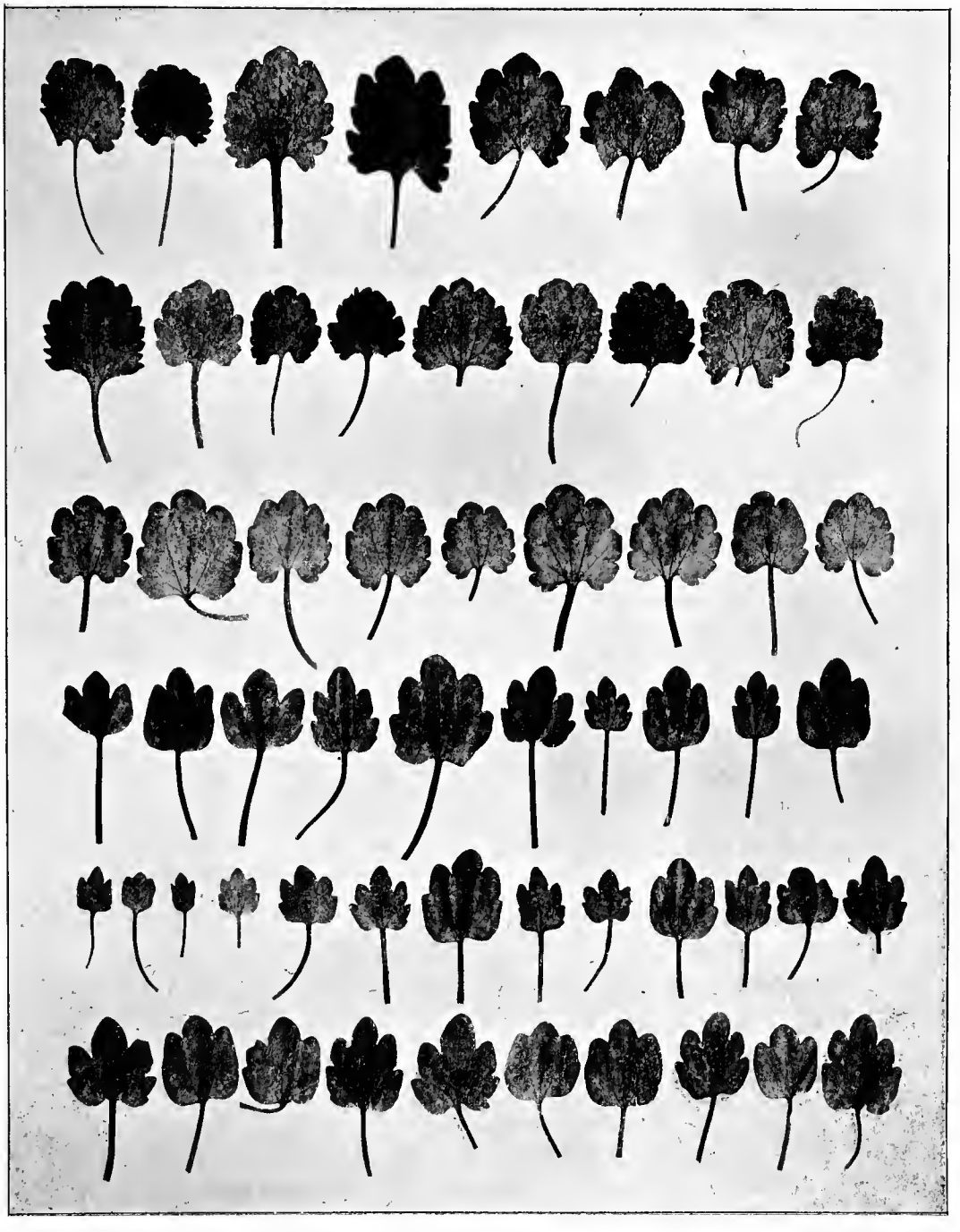

Fig. 88. The three upper rows showing different leaves of *Ranunculus Cymbalaria* PURSCH. (The two uppermost originating from various American specimens; in the third are seen leaves from specimens found in Norway). The three lower rows representing leaves of the Asiatic *Ranunculus subsimilis* nov. spec. ($^1/_1$)

rather small and numerous, the broadest and largest near the upper end of the leaf, from where gradually decreasing in size downwards along the margins. The indenta-

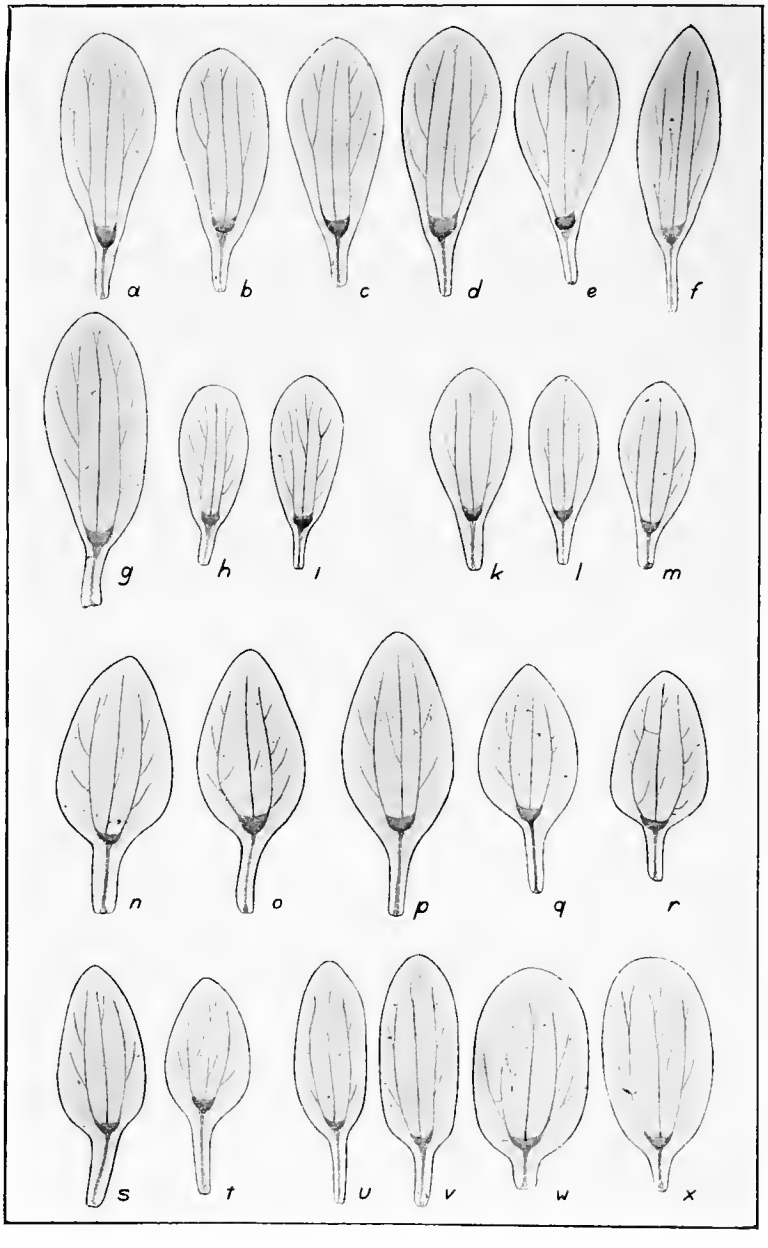

Fig. 89. a—i show petals of *Ranunculus Cymbalaria* Pursch from America, k—m of Norwegian specimens, u—x of specimens from India. (An nov. spec.?). n—t are petals of *Ranunculus subsimilis* nov. spec. from Asia. (The Minusinsk district). (8/1).

tions are rather small and very narrow, the lobes broad, broadly obtuse or even flattened at the top, especially the lower ones.

The Siberian specimens have, on the other hand, more quadrangular leaves, with a square cut base, only rarely and quite exceptionally somewhat cordately incised. The indentations of the leaves are fewer in number, and coarser, generally 3 or 5, with much deeper and broader incisions, and with nearly cuneate or triangular teeth, subacute or subrotundate at the apex, generally more or less distinctly pointing upwards. The shape of the leaves in both the species is, for the rest, rather much varying, and in the figure annexed I have brought together a fairly rich material from different regions of Siberia and America in order to represent the range of the variations of the leaves.

After observing this difference in the structure of the leaves, I have made a more minute comparison between the Siberian and American specimens.

There proved, indeed, to be a typical and absolutely constant difference in the shape of the petals. These are very small, generally only from 3 to 5 mm. long. Fig. 89 shows the distinctions in the petals, and has been drawn from a great variety of specimens taken in various localities. Fig. a—i show petals of American specimens, fig. n—t of various Siberian ones. It will appear that the size of the petals is much varying, and so is the proportion between length and breadth. There is, on the other hand, a marked difference in the shape of the petals in these two types. Thus, all of the American specimens are seen to have all but obovate petals, broadest above the middle, and broadly rounded at the top, in the lower part gradually tapering, passing by degrees into the equally broad claw.

The petals of the Siberian specimens, on the contrary, are pointedly ovate, subacutish at the top, broadest below the middle, rounded at the base, and abruptly narrowed into the claw. This shape of the petals is constant in all the Siberian specimens I have examined.

There is, according to the above mentioned, a difference so strongly marked, based upon absolutely constant systematic characters, between the American specimens and the Siberian ones that I have found it necessary to seperate them into 2 distinct species. As Pursch has described the species from American material, the name of *Ranunculus Cymbalaria* will have to be maintained for this one, the Siberian type being separated as a distinct species:

Ranunculus (Oxygraphis) subsimilis nov. spec.

Radix fibrosa. Humilis, tantummodo 2—6 cm. alta, glabra vel pilis sparsis instructa, stolones repentes uberius emittens. Folia basalia erecta, longe petiolata, petioli 2—5 cm. longi, basin versus marginibus membranaceis dilatati. Lamina 5—15 mm. longa, glabra, in circuitu fere quadrata, basi plus minus recte abscissa, superne leviter attenuata, antice 3—5 dentibus grossis vel lobis instructa, postice integerrima; lobi plus minus distincte subtriangulares, basi latissimi, superne cuneatim attenuati, apice subobtusi vel subacuti. Caules floriferi erecti, teretes, aphylli, foliis basilaribus aequilongi, rare foliorum longitudinem paulo superantes, vulgo simplices, uniflori, raro ramosi, bi-vel triflori. Diameter floris 6—9 mm. Sepala 4—5 mm. longa, excavata,

ovata, reflexa, glabra, apice late rotundata, fere trinervia, paene membranacea. Petala parva, 3—4 mm. longa, intense lutea, acriter ovata vel subtriangulata, latissima infra medium, apicem versus leviter attenuata, vulgo plus minus distincte subacuta, inferne in unguem aequilatum abrupte contracta, supra unguem nectario distincto praedita. Carpella circa 1 mm. longa subcompressa, apice obliqua et in rostrum breve, conicum protracta, tempore florescendi in capitulum, 3—4 mm. in diametro conferta.

This species seemed, in other respects, to be characteristic in having the stem generally rather short, most frequently about the length of the leaves or slightly longer, generally uniflorous and aphyllous, the leaves rather fleshy, and of a yellowish colour when dried. I have not been able to point out any marked difference in the structure of the achenes on account of the scarcity of my material, the ripe fruits being liable to loosening, and, in dried material, to falling off.

Some years ago, in 1916, *Ranunculus Cymbalaria* was also found in southern Norway, on Asmal, one of the islands in the Hvaler group. (R. NORDHAGEN in Nyt Magazin for Naturvidenskaperne B. 55, p. 119—145), and this locality being at that time the only habitat of the plant known in Europe, suggestions have been made as to the cause of this isolated occurrence.[1])

The author supposes, no doubt with good reason, that it has recently immigrated into Europe, as a straggler over great distances, accordingly either from America or from Siberia. The former view seemed to be the most probable, as it approaches very closely a small group of American species, such as *Eriocaulon septangulare* WITH., *Spiranthes Romanzowiana* CHAM., *Sisyrinchium angustifolium* MILL., to be found in a few localities in western Europe, probably spread by the sea-currents of the Atlantic. He also asserts the possibility of the species having been introduced from Siberia, dispersed by migratory birds on their way westwards, but if this be the case, it is rather strange that it is altogether wanting in interjacent places, as in central, eastern, and south-eastern Europe, the way of the Siberian birds of passage leading through these particular regions, abounding in situations apparently well suited for habitats.

I have, however, by this time examined these Norwegian specimens. In figure 88, the third row from above shows leaves, and figure 89 k—m petals from Norwegian specimens. It appears that they agree into details with the American ones, with the typical *Ranunculus Cymbalaria*, and I may, therefore, lay down the Norwegian specimens to be connected with the American ones, and to have been spread from America. Where occurring in Asia, *Ranunculus subsimilis* did not seem to be dependent on saline soil only. On the contrary, the various authors seemed to agree on the opinion that it occurs rather frequently in swamps and on sandy banks of rivers. I have collected it myself on sandy, grass-grown banks of rivers, near Ust Abakansk, where occurring asso-

[1]) About the same time the species was also found in another locality not for away, viz. on the south-western coast of Sweden, in Bohuslän.

ciated with plants such as *Hierochloë odorata*, *Potentilla anserina*, *Ranunculus reptans*, *Scirpus alpinus* var. *oliganthus*, in incipient flowering at the beginning of June.

Owing to the fact that this plant grows under rather different edaphical conditions, in very saliferous to completely saltless, apparently generally sandy soil, there is a possibility that the plant may be influenced by this circumstance. On account of the scarcity of my material, with too inaccurate records of situations, I have not been able to perceive any regularity in this direction.

In conclusion I may add that in the herbarium of the University at Christiania I have seen a couple of specimens „Ex. Herb. Ind. Or. Hook. fil. et Thomson, Hab. Ladabele". Even in point of habitus these specimens differ rather much from the above-mentioned 2 types, the leaves being long and narrow, generally several times as long as broad. Some are completely entire and lanceolate, and others furnished with some few teeth near the summit. These specimens also differ in the shape of the petals. Fig. 89, u—x, representing petals from two different specimens, show that the lamina is oblong elliptic, equally broad, obtusely rounded at both ends. My material, however, is not so extensive as to enable me to examine the constancy of these characters. There remains a possibility that the specimens in question may have to be entered as a third distinct species, distributed over south-western Asia, and that future examinations will establish the original *Ranunculus Cymbalaria* Pursch to comprise several well defined species, both systematically and in point of geographic distribution. I might especially draw attention to the more isolated occurrences, such as those in South America and the above-mentioned Indian specimens.

In alpine situations and in northern regions, *Ranunculus Cymbalaria* occurs under a slightly reduced form, var. *alpina*, recorded from Asia as well as from America. I have had no opportunity of examining it.

Ranunculus plantaginifolius Murr. in Nov. Comment. Goetting. VIII, p. 391 (excl. syn. Amman.); Ledeb. Fl. Alt. II, p. 312; Ledeb. Fl. Ross. I, p. 33; Turczan. Fl. Baical.-Dahur. (1842) p. 50, no. 33; Regel, Pl. Radd. (1861) p. 42; Крыл. Фл. Алт. I (1901) p. 24. *Ranunculus salsuginosus* Turczan. Cat. Baical. no. 33.

Rather common on the Abakan Steppe, at Ust Kamuishto, on saliferous soil, accompanying *Lepidium crassifolium*, *Potentilla anserina*, *Primula longiscapa*, *Plantago maritima*, and *Triglochin palustre*. In full flower in the second half of June. The leaves of the specimens collected are but slightly, nearly imperceptibly toothed.

Distribution: Southern Siberia from the Altai region, eastwards to Trans Baikal, Mongolia, northern China.

Ranunculus pulchellus C. A. Meyer in Ledeb. Fl. Alt. II, p. 333; Turczan. Cat. Baical. no. 42; Ledeb. Fl. Ross. I, p. 33; Turczan. Fl. Baical.-Dahur. (1842) p. 60, no. 48; Regel, Pl. Radd. (1861) p. 41; Крыл. Фл. Алт. I (1901) p. 23.

In moist meadows near Minusinsk. In full flower at the beginning of July.

Distribution: From Russian Turkestan and the Altai region through southern Siberia to about Lake Baikal, northern Mongolia.

Batrachospermum paucistamineum (Tausch) Gelert, Stud. Sl. *Batrachium* in Botan. Tidsskr. B. 19 (1894—95) p. 26. *Ranunculus aquatilis* L. Spec. Pl. ed. II (1762) p. 781; Ledeb. Fl. Alt. II, p. 334; Turczan. Cat. Baical. no. 30; Ledeb. Fl. Ross. I, p. 27; Turczan. Fl. Baical.-Dahur. (1842) p. 48, no. 30; Regel, Pl. Radd. (1861) p. 38; Крыл. Фл. Алт. I (1901) p. 21.

subspec. **divaricatum** (Schrank) Gelert, l. c. *Ranunculus aquatilis β capillaceus* in Ledeb. Fl. Alt. II, p. 334. *Ranunculus aquatilis* var. *pantothrix* in Ledeb. Fl. Ross. I, p. 27; Regel, Pl. Radd. (1861) p. 38; Крыл. l. c. *Ranunculus aquatilis α* in Turczan. Fl. Baical.-Dahur. (1842) p. 48, no. 30.

Common in still or very slow waters in the river Abakan, in shallow places, frequently accompanying *Potamogeton perfoliatus* and species of *Sparganium*. Most of the specimens had only young flower-buds as late as about the end of June; a few specimens, with fully opened flowers, however, show that the flowers are very small, the petals only about 4 mm. long, and, accordingly, somewhat smaller than recorded by Regel. The fruit-buds agree perfectly as to their shape with Gelert's drawing l. c. p. 16, fig. 17, whereby this form may be distinctly separated from the form *sajanensis* from the Sayansk district, described by Regel, recorded to have glabrous fruits. One of the chief characters of the variety is also recorded to be the stiffness of the filiform lobes of the leaves, not clasping together when taken out of the water. This species is also of common occurrence in the Urjankai country, where found by me at Ust Sisti-kem, near Ust Kamsara, and at Ust Tara-kem.

Distribution: The species is of common occurrence in the temperate regions of the northern hemisphere, South Africa and Australia.

Oxygraphis glacialis Bunge, Suppl. Fl. Alt. p. 356; Turczan. Cat. Baical. no. 51; Ledeb. Fl. Ross. I, p. 47; Turczan. Fl. Baical.-Dahur. (1842) p. 47, no. 29; Regel, Pl. Radd. (1861) p. 50; Крыл. Фл. Алт. I (1901) p. 31.

Only one specimen belonging to this species occurs in my collections, taken in the Altaian, on cliffs, among lichens, at an altitude of about 2200 m. above sea-level, near the perennial snow. The specimen, bearing 4 leaves, is 5 cm. high, the petioles about 4 cm. long, the lamina rather broadly ovate, about 1 cm. long; the margin is nearly entire or only slightly, nearly imperceptibly obtusely crenate. The sepals are ovate, about 5 mm. long. The flower nearly past flowering at the end of July.

Distribution: Russian Turkestan, the Thian-Shan, the Himalayas, the eastern Altai, the Sayansk district (northern Mongolia), Trans Baikal, on the mouth of the river Lena, the Tshuksher Peninsula, Kamtchatka.

Caltha palustris L. Fl. Lappon. (1737) p. 227 et Spec. Pl. ed. II (1762) p. 784; Ledeb. Fl. Alt. II, p. 303; Turczan. Cat. Baical. no. 52; Ledeb. Fl. Ross. I, p. 48; Turczan. Fl. Baical.-Dahur. (1842) p. 61, no. 49; Regel, Pl. Radd. (1861) p. 52; Huth, Monogr. Gatt. *Caltha* in Abh. Vortr. Geb. Naturw. 130, IV (1891) p 17; Крыл. Фл. Алт. I (1901) p. 32.

Rather common everywhere in moist grass-fields, on brooks, etc. in the territory explored. The material collected varies considerably in nearly all characters, and the numerous forms seemed to pass gradually into each other.

Near Ust Abakansk I have gathered a rather luxuriant form, with vigorous, erect stems, generally bearing from 8 to 10 flowers each. The leaves are markedly reniform, generally completely or nearly completely entire. Each flower is comparatively small, length of the sepals from 12 to 15 mm., and generally 5 in number. Moreover, these specimens are distinguished by having numerous follicles, varying from 12 to 17 in number. I have met with this species in brooks and swamps between Minusinsk and Kushabar, on the Upper Amyl, the Sisti-kem and Bei-kem, right up to the Dora Steppe. In the Altaian found by me along mountain rivulets, up to altitudes of about 2000 m. above sea-level. The species flowers in June and July.

In alpine regions of the Altaian I have collected specimens belonging to a lower form, with orbicular or cordiform leaves, and the margin acutely serrulate. The flowers are few in number, only 3 on each stem, comparatively large, the flower about 3,3 cm. in diameter, and the sepals, of which the number is generally from 5 to 7, are distinguished by being comparatively broad and short, and furnished with prominent darker nerves. The number of the follicles is comparatively small, generally from 5 to 6. These specimens may possibly belong to *Caltha alpina* Schur, Enum. Pl. Transsilv. (1866) p. 26, but all the specimens being young and flowering, without ripe fruits, a reliable decision is difficult.

Distribution: Europe, except the extreme south, Siberia, eastwards to the Sea of Okhotsk and Manchooria, northern and eastern Mongolia, the western Himalayas, China, Japan, Sakhalin, North America. In Tibet and the eastern Himalayas there occurs the nearly allied species, *Caltha scaposa* Hook. et Th.

Trollius asiaticus L. Spec. Pl. ed. II (1762) p. 782; Ledeb. Fl. Alt. II, p. 301; Bunge, Enum. Alt. no. 34; Turczan. Cat. Baical. no. 54; Ledeb. Fl. Ross. I, p. 50; Turczan. Fl. Baical.-Dahur. (1842) p. 63, no. 51 ex parte; Regel, Pl. Radd. (1861) p. 57; Крыл. Фл. Алт. I (1901) p. 33; Huth, Rev. Art. *Trollius* („Helios" Monatl. Mitth. Naturwissensch. B. IX, no. 1) p. 2.

var. **typicus** Regel, l. c. p. 57; Huth, l. c. p. 3.

Rather frequent on the Abakan Steppe, in moist meadows near Askys, where occurring associated with *Ranunculus acris* and *R. repens, Primula sibirica, Cypripedilum macranthum, Orchis sp. div., Carex sp. div.*, etc. I have, moreover, found this species near Kushabar, at Kalna, and Ust Algiac. Taken in full flower in June and July. The flowers in this species do not exceed, to judge from the material collected, 3,5 cm.

var. **stenopetalus** Regel, l. c. p. 57; Huth, l. c. p. 3.

Very common in the Altaian, in alpine situations up to 2000 m. above sea-level, where one of the prettiest plants, with large flowers, to 5 cm. wide, of a darkish yellow to an orange colour. This variety is especially distinguished from the preceding one by its considerably large flowers, of a deeper colour. Occurring in moist, partly irrigated places, on mountain rivulets, etc., accompanying *Caltha palustris*, *Aquilegia glandulosa*, *Aconitum laeve*, *Allium Schoenoprasum*, and others. In full flower at the end of July.

Distribution: Eastern Russia, Russian Turkestan, northern Mongolia (the Sayansk district).

Leptopyrum fumarioides Reichenb. Fl. Germ. Excurs. (1828) p. 747. *Isopyrum fumarioides* L. Spec. Pl. ed. II (1762) p. 783; Ledeb. Fl. Alt. II, p. 299; Turczan. Cat. Baical. no. 59; Ledeb. Fl. Ross. I, p. 53; Turczan. Fl. Baical.-Dahur. (1842) p. 66, no. 55; Regel, Pl. Radd. (1861) p. 63; Maxim. in Mel. Biol. XI (1883) p. 637; Крыл. Фл. Алт. I (1901) p. 35.

On the steppe between Minusinsk and Ust Abakansk, near habitations. In flower and with fruits at the beginning of June. Number of follicles generally 10, more rarely 12 or 13.

Distribution: Siberia, eastwards to the Amoor Province, northern and eastern Mongolia, Manchooria and northern Tibet. Of late also in France and Belgium (Komarow).

Aquilegia glandulosa Fisch. ex Link. Enum. Hort. Berol. II (1822) p. 84; Ledeb. Fl. Alt. II, p. 296; Turczan. Cat. Baical. no. 60; Ledeb. Fl. Ross. I, p. 56; Turczan. Fl. Baical.-Dahur. (1842) p. 69, no. 59; Крыл. Фл. Алт. I (1901) p. 36.

This species occurs in the Altaian from the limit of tree vegetation or somewhat lower, up to 2000 or 2100 m. above sea-level. With its splendid, large flowers of a deep blue, the diameter of which I have found to be up to 11 cm., it is one of the very prettiest and most conspicuous alpine plants of this region. In places, especially on somewhat moist mountain sides, it abounds, so as to cover the ground, here and there nearly exclusively, over large tracts of land. It is also frequently associated with the large-flowered *Trollius asiaticus* var. *stenopetalus*, and *Caltha palustris*. The stems are generally 50 cm. high, the lower part glabrous, and the upper part more or less hairy. Taken with fully opened flowers at the end of July.

Distribution: Through southern Siberia and northern Mongolia from the Thian-Shan, eastwards through the Altai region and the Sayansk district to about Lake Baikal.

Aquilegia sibirica Lam. Encycl. I (1783) p. 150; Ledeb. Fl. Alt. II, p. 296; Turczan. Cat. Baical. no. 61; Ledeb. Fl. Ross. I, p. 56 et 736; Turczan. Fl. Baical.-Dahur. (1842) p. 68, no. 57; Крыл. Фл. Алт. I (1901) p. 36.

Scattered in subalpine meadows in woods about the Upper Amyl, where frequently occurring together with *Veratrum album*. In full flower in July.

Distribution: Siberia from the government of Tomsk to the west, and eastwards to Trans Baikal and Yakutsk.

Delphinium grandiflorum L. Spec. Pl. ed. II (1762) p. 749; Ledeb. Fl. Alt. II, p. 289; Turczan. Cat. Baical. no. 65; Ledeb. Fl. Ross. I, p. 60; Turczan. Fl. Baical.-Dahur. (1842) p. 72, no. 63; Regel, Pl. Radd. (1861) p. 65; Franchet, Expos. Synopt. Descript. *Delphin.* Chine in Bull. Soc. Phil. Paris 1893, p. 168; Huth, Monogr. Gatt. *Delphinium* in Botan. Jahrb. XX (1895) p. 461; Крыл. Фл. Алт. I (1901) p. 37.

The specimens collected by me, belong to the form described by TURCZANINOW, l. c. under f. *α*. The stems are erect, from 50 to 60 cm. high, generally branched only above the middle. The leaves are divided into narrowly linear segments, about 1 or 1,5 mm. broad, in their whole length equally broad, and pointed towards the summit. The length of the spur is about 15 or 16 mm., the average breadth about 2,5 mm. The whole plant is covered with rather dense, short, and appressed hairs.

Common among dry sand, and in dry, open woods of *Pinus silvestris*, about Minusinsk and the village of Buistraja, in similar situations near Tagarski osero as well as at Ust Abakansk. Here and there it is associated with *Chamaerhodos erecta* and *Scabiosa ochroleuca*. In full flower and with flower-buds in the first half of July.

Distribution: Southern Siberia, from about the Altai and the Yenisei, eastwards to the Amoor Province, Manchooria, Mongolia, northern China, Corea. According to HUTH l. c., this plant also occurs about Washington, a report also entered by KOMAROW, Фл. Маньчжуріи II (1903) p. 248 as well, adding, however, a sign of interrogation.

Delphinium elatum L. Spec. Pl. ed. II (1762) p. 749; Ledeb. Fl. Ross. I, p. 63; Turczan. Fl. Baical.-Dahur. (1842) p. 75, no. 66; Regel, Pl. Radd. (1861) p. 69; Huth, Monogr. Gatt. *Delphinium* (1895) p. 398; Крыл. Фл. Алт. I (1901) p. 39. *Delphinium intermedium* Ledeb. Fl. Alt. II, p. 290.

In thickets on the river Abakan, near Ust Abakansk. This species, however, is especially frequent about Kushabar, on somewhat moist, not unfrequently shady mountain sides, and in the subalpine tracts of land on the Upper Amyl, where, in places, in glades, making up dense associations, not easily penetrable, where the stems may exceed considerably the height of a man, towards some 3 m. high, or even more. It is here frequently associated with *Veratrum album* and *Heracleum dissectum*. In full flower in July.

Distribution: Middle Europe, from the Pyrenees to the west, Russia and Russian Turkestan, Siberia, except the extreme east. In eastern Asia replaced by *Delphinium Maackianum* REGEL.

Aconitum ambiguum Reichenb. Illustr. Spec. *Aconiti* Gener. (1823—27) tab. XXIII.

subspec. **alpinum** (Turczan.) nov. comb. *Aconitum ambiguum* Reichenb. in Rapaics Raymund, System. *Aconiti* Gener. in Nøvinytani Køzlemenyek (1907) p. 144; Ledeb. Fl.

Alt. II, p. 283; Turczan. Fl. Baical.-Dahur. (1842), p. 81, no. 72. *Aconitum Napellus* C. A. Meyer in Ledeb. Fl. Alt. II, p. 283; Turczan. Cat. Baical. no. 77; Ledeb. Fl. Ross. I, p. 69. *Aconitum Napellus β alpinum* a *ambiguum* Regel, Pl. Radd. (1861) p. 103. *Aconitum Napellus β alpinum* Regel, Крыл. Фл. Алт. I (1901) p. 41. *Aconitum Napellus β alpinum* b *laxum, altaicum* et *soongaricum* Regel, l. c. p. 104 et 105. [Tab. V, Fig. 1].

The specimens referred to this subspecies by me, are especially distinguished from the typical species by having a lower growth, and by having few-flowered stems, generally 2-flowered only. The stems are about 20 cm. high, bearing from 1 to 3, generally 2 rather large flowers. They are, no doubt, identical with specimens which I have seen in the herbarium of the Imperial Botanical Gardens at Petrograd, with the following inscription, in Turczaninow's hand, on a label: „*Aconitum Baicalense* mihi *γ alpinum*. In alpe Urgudei 1829. Turcz." It is no doubt the same specimens entered by Turczaninow in 1842, in his Fl. Baical.-Dahur. p. 81, as *Aconitum ambiguum* Reichenb. After a rather defective diagnosis, agreeing in the main with the above-mentioned specimens, however, he adds the following note: „Talis est planta, quam in alpe Urgudei et in Dahuria inveni,....." Regel has, on a subsequent occasion, examined these authentic specimens of Turczaninow's of *Aconitum baicalense γ alpinum*, and has given the following additional note in the sheets: „*A. Napellus L. β alpinum* a *ambiguum*, teste Regel."

This species, which seemed to be comparatively widely distributed in the alpine regions of central and eastern Asia, has by later authors been referred partly to *A. Napellus* L., partly to *A. ambiguum* Reichenb. Thus, Komarow enters it in his Фл. Маньчжурии II (1903) p. 259 as *A. Napellus β alpinum* lusus a *ambiguum* Regel (*A. ambiguum* Turczan.).

The distinctions between the two said species are, by the way, very trite, and the transition between the varieties of *Aconitum Napellus* having toothed or smooth stamens — as Reichenbach's species *A. Hoppeanum* and *Koelleanum*, only to be understood as varieties of *A. Napellus* — especially seemed to be rather insignificant.

The reason, however, of my acquiescing in referring the specimens in question as a variety to A. *ambiguum* is owing to the fact that there really are universal although not very strongly marked differences between the Asiatic form and the European ones. The first-mentioned is distinguished by a more slender and fine growth, with fewer and more scattered flowers, and by being generally more or less glabrous, whereas the European *A. Napellus* with its numerous varieties, by being mostly of a higher and more vigorous growth, more flowery and more densely flowered, with stems more or less distinctly hairy. The segments of the leaves in the Siberian *A. ambiguum* are also mostly broader than in *A. Napellus* and its varieties, and always broader than the stem.

The specimens collected by me in the Altaian are distinguished by stems about 20 cm. high, rigid, erect, or sometimes curved at the base. The root is tuberously thickened, about the size of a pea. The leaves are completely glabrous, deeply 5—7 cleft, or divided, the divisions obovate, cuneate at the base, deeply indented into lanceolate

sections, subacutish at the top. The lower leaves are long-petioled, the upper ones sessile. The flower cluster is very few-flowered, generally 2-flowered, more rarely 1 or 3-flowered, on comparatively short pedicels, rather densely covered with yellowish green hairs, but not glandular, of which I have been able to ascertain through a microscopic examination. This hairiness consists of 2-celled hairs, formed from one broader, swollen and barrel-formed basal cell, and one long and narrow, even, nearly hyaline top

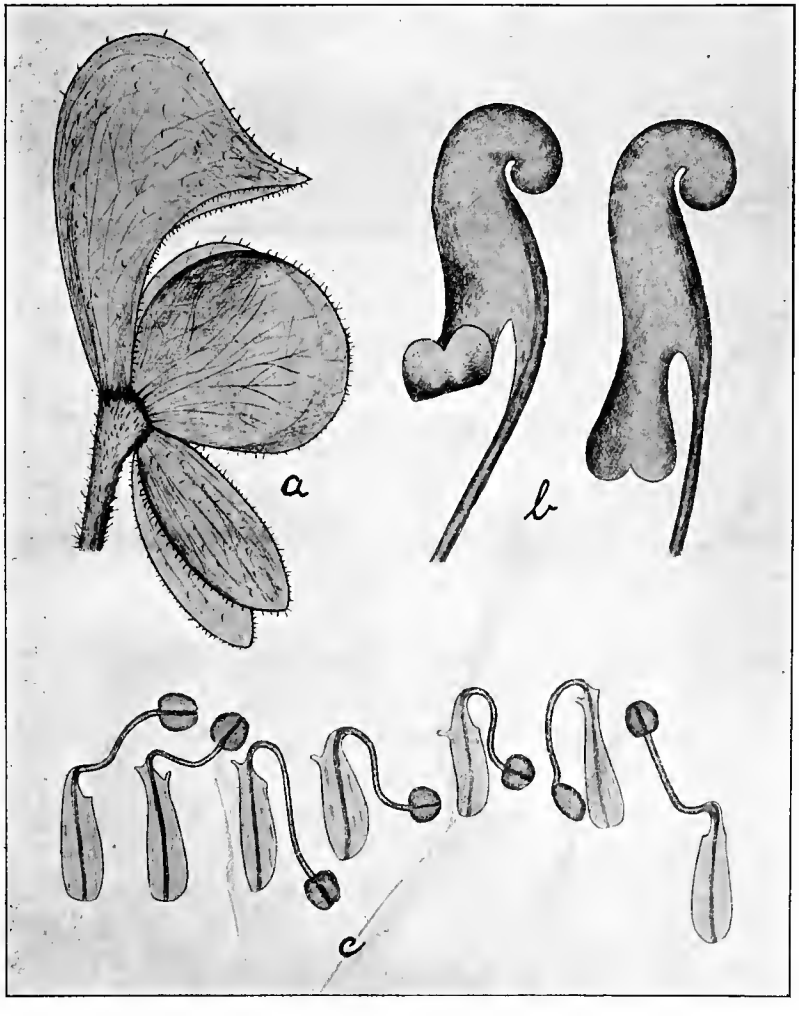

Fig. 90. *Aconitum ambiguum* REICHENB. subspec. *alpinum* (TURCZAN.) nov. comb. a. Flower (ca. $^2/_1$). — b. Nectaries. — c. Stamens. (ca. $^6/_1$).

cell. A similar hairiness is to be found in several other species of *Aconitum*, as for instance in *A. laeve*, but not in all. The hairiness of *A. barbatum*, for instance, consists of hairs of a quite different structure. The pedicels are somewhat swollen at the top. The bracts are very small, truncate, unnerved, more or less hairy, according to

the pedicel. The flowers are rather large, and of a deep blue. The galea is more or less arched and high, the length to twice the breadth, and beaked at the top. The medial sepals are nearly orbicular, slightly oblique, from 12 to 15 mm. in diameter, with distinct marginal hairs, and not unfrequently hairy inside. The lower sepals are ovate-lanceolate, 11 to 14 mm. long, and 4 to 5 mm. broad, all but rounded, or slightly acutish at the top. When young the sepals are beset with scattered hairs, when older glabrous or nearly completely so, but generally with more or less distinct marginal hairs. The beak of the galea is generally furnished with a small tuft of hairs. The stalks of the nectaries are from 1,5 to 2,5 cm. long, curved, completely glabrous, the spur itself obtuse, and spirally rolled up at the top. The hind free lip is to 7 mm. long, and from 2 to 3 mm. broad, slightly cordately indented, with rounded sections, and completely glabrous. In *A. Napellus* the lip is still more narrowly and deeply indented, and frequently hairy. The stamens are completely glabrous, and the base furnished with broad wings or fringes, reaching half way up along the filaments, generally ending in a tooth on each side. This tooth, according to REICHENBACH, of some systematic value, may be more or less distinctly developed, and may pass through a great variety of intermediate forms into nearly or altogether disappearing, the fringe then narrowing upwards, and passing gradually into the filament itself. Now and then it may be unilaterally developed as well. The number of the carpels is 3 (only very rarely 5), and they are completely glabrous.

Specimens belonging to this species have been collected by me in the Altaian, in full flower in the second half of June. It also seemed to be rather widely distributed in the alpine regions of central Asia, eastwards right up to the Sea of Okhotsk.

Aconitum volubile Pallas, En. Hort. Demidov. (1781) p. 21; Крыл. Фл. Алт. I (1901) p. 41.

subspec. **ciliare** (DC.) Rapcs. var. **rectiusculum** (Reichenb.) Rapcs. System. *Aconiti* Gener. (1907) p. 155. *A. volubile* Pall., Ledeb. Fl. Alt. II, p. 281; Ledeb. Fl. Ross. I, p. 68; Regel. Pl. Radd. (1861) p. 117. *A. volubile* var. *villosum* Regel in Bull. Soc. Imp. Nat. Moscou (1864) p. 92. *A. villosum* Reichenb., Ledeb. Fl. Alt. II, p. 182; Ledeb. Fl. Ross. I, p. 68. *A. villosum α rectiusculum* Reichenb. Illustr. Spec. *Aconiti* (1823—27) tab. XXVI.

Taken in subalpine regions about Ust Algiac, where generally occurring in open, grass-grown places, in thicket of birch. With young, not fully opened flowers in the second half of July.

Distribution: Siberia from about the government of Tomsk to the west, to the Sea of Okhotsk, northern Mongolia, northern China, Manchooria.

Aconitum barbatum Patr. in Pers. Synops. II (1807) p. 83; Rapcs. System. *Aconiti* Gener. (1907) p. 174; Reichenb. Illustr. Spec. *Aconiti* (1823)—27) tab. XLV; Turczan. Cat. Baical. no. 72: Ledeb. Fl. Ross. I, p. 67; Turczan. Fl. Baical.-Dahur. (1842) p. 79, no. 69; Крыл. Фл. Алт. I (1901) p. 43. *A. Gmelini* Reichenb., Ledeb. Fl. Alt. II, p. 284; Tur-

czan. Cat. Baical. no. 73; Turczan. l. c. (1842) p. 79, no. 70. *A. ochranthum* C. A. Meyer in Ledeb. Fl. Alt. II, p. 285. *A. Lycoctonum* var. *Gmelini* et var. *barbatum* Regel, Pl. Radd. (1861) p. 111, no. 116.

The above is one of the most common species of *Aconitum* in the territory explored, occurring especially in dry meadows and on declivities in the transition zone between the steppe and wood regions — in the wooded steppe region — as for instance about Kushabar. About Ust Sisti-kem and Ust Tara-kem I have taken it on dry, sloping hills, in open woods of pine and aspen, associated with *Cotyledon spinosa*, and others.

The species begins flowering about the middle of July.

Distribution: Southern Siberia from the government of Tomsk, eastwards to the Amoor Province, northern Mongolia, northern China, Manchooria.

Aconitum laeve Royle, Illustr. Himal. (1834) p. 45; Rapcs. System. *Aconiti* Gener. (1907) p. 167; Stapf, Aconites India Monogr. in Ann. Roy. Bot. Gard. Calcut. X (1905), p. 136, t. 92. *A. excelsum* Reichenb. Illustr. Spec. *Aconiti* (1823—27) tab. LIII partim. Turczan. Cat. Baical. no. 20. *A. lycoctonum* L., Ledeb. Fl. Ross. I, p. 66 partim; Turczan. Fl. Baical.-Dahur. (1842) p. 78, no. 68. *A. Lycoctonum* L. *β septentrionale* Herder, Pl. Radd. (1861) p. 72. *A. vulparia* C. A. Meyer in Ledeb. Fl. Alt. II, p. 287. *A. Lycoctonum fl. lilac.* Regel in Bull. Soc. Imp. Nat. Moscou XXXIV (1861) p. 73 partim. *A. septentrionale* Kølle, Крыл. Фл. Алт. I (1901) p. 42.

A. laeve Royle is very nearly allied to *A. septentrionale*, occurring as a substitute for this species in Asia. The specimens found by me resemble much Reichenbach's figure of *A. exelsum* l. c., entered by Rapaics Raymund too, as a synonym of this species. The stalk of the nectaries, however, in the specimens collected by me, are furnished with scattered, but rather long, downy hairs. The medial sepals are rather oblique, which appears distinctly from the annexed figure of the flower and its component parts, fig. 91. The specimens are also readily distinguished from Stapf's drawing of this species l. c. by their equally broad spurs, spirally rolled up at the top, the lips of which are also considerably shorter. Moreover, the flowers are larger than recorded by Stapf, the maximal breadth of the galea, near the top, from 7 to 8 mm. The stamens are about 6 mm. long.

Of common occurrence in the subalpine woods about Kushabar, in the Amyl valley, near Ust Algiac, and in the taiga on the Sisti-kem. In full flower and incipient fruit formation in the middle of July.

Distribution: Siberia, eastwards as far as the Amoor Province, northern Mongolia, Corea, China, Türkestan, the Himalayas, Cashmere.

Actaea spicata L. Spec. Pl. ed. II (1762) p. 722.

subspec. **erythrocarpa** Turczan. Cat. Baical. no. 79; Ledeb. Fl. Ross. I, p. 71; Regel, Pl. Radd. (1861) p. 119; Крыл. Фл. Алт. I (1901) p. 44. *β spicata* in Turczan. Fl. Baical.-Dahur. (1842) p. 84, no. 76. *β rubra* Big., Ledeb. Fl. Alt. II, p. 275. *β erythrocarpa*

Fischer ex Turczan. l. c. Huth, Revis. *Ranuncul.* Gatt. in Engler's Botan. Jahrb. XVI (1893) p. 309.

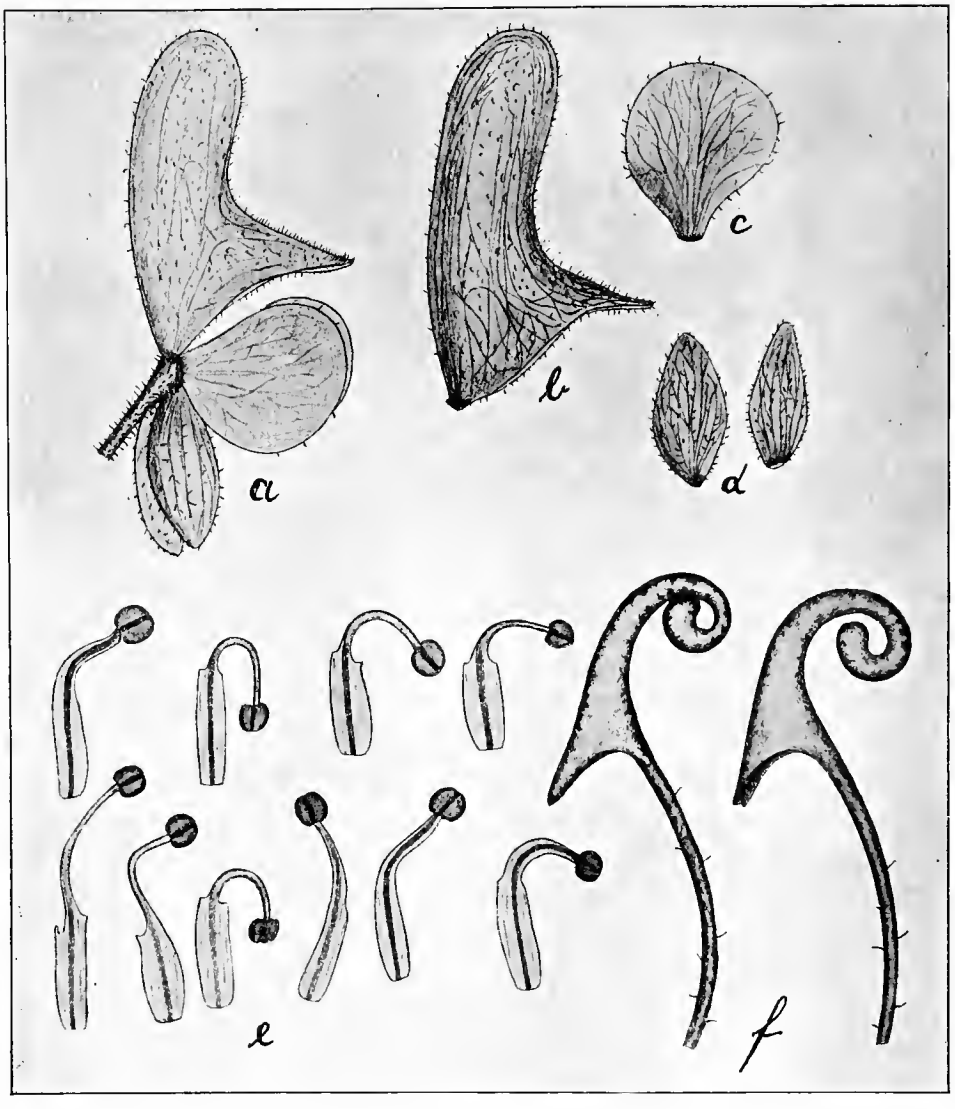

Fig. 91. *Aconitum laeve* Royle. a. Flower. — b. Galea — c. Medial sepals. — d. Lower sepals (ca. 2/1). — e. Stamens. — f. Nectaries. (ca. 6/1).

In shady thickets, near Kushabar, in the taiga on the Upper Amyl, and near Ust Sisti-kem. With nearly ripe fruits about the middle of July.

Distribution: The subspec. *erythrocarpa* is distributed over north-eastern Russia, Siberia from the Ural to Kamtchatka, northern Mongolia, Manchooria, Sakhalin.

Paeonia anomala L. Mantissa p. 247; Ledeb. Fl. Alt. II, p. 277; Turczan. Cat. Baical. no. 83; Ledeb. Fl. Ross. I, p. 74; Turczan. Fl. Baical.-Dahur. (1842) p. 88, no. 80; Regel,

Pl. Radd (1861) p. 125; Huth, Monogr. Gatt. *Paeonia* in Engler's Botan. Jahrb. XIV (1892) p. 268; Крыл. Фл. Алт. I (1901) p. 46.

f. typica Regel, Pl. Radd. (1861) p. 125. *P. anomala* α in Ledeb. Fl. Ross. I, p. 74; Turczan. l. c. p. 88.

Very common in the woods about the Upper Amyl from Kushabar southwards, and scattered in the Urjankai country about the rivers Algiac and Sisti-kem. Only a few specimens in flower, most of them past flowering, and with nearly ripe fruits, in the middle of July.

Distribution: North-eastern Russia, Siberia, from the Ural eastwards to Lake Baikal, Turkestan, northern Mongolia.

Papaveraceae Juss.

Chelidonium majus L. Spec. Pl. ed. II (1762) p. 723; Fedde, *Papaverac.* in Engl. Pflanzenr. H. 40 (IV, 104, 1909) p. 212; Бушъ, *Papaverac.* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 10; Ledeb. Fl. Alt. II, p. 271; Ledeb. Fl. Ross. I, p. 91; Крыл. Фл. Алт. I (1901) p. 52.

subspec. **grandiflorum** DC. Syst. II (1821) p. 99; Fedde, l. c. p. 215; Бушъ, l. c. p. 11; Ledeb. Fl. Ross. I, p. 91. *Chelidonium majus* β in Turczan. Fl. Baical.-Dahur. (1842) p. 100, no. 90. *Chelidonium majus* in Regel, Pl. Radd. (1861) p. 133, no. 160. *Chelidonium grandiflorum* DC. in Turczan. Cat. Baical. no. 95.

Rather common in thickets, on the islets in the Yenisei and Abakan rivers, where it begins flowering at the beginning of June. Observed by me at Karatus and Kushabar, in the Amyl taiga and in the Urjankai country about the Sisti-kem, and near Kamsara, among brush-wood, on dry, stony slopes, and the like. This subspecies, occurring only in the eastern part of the geographical area of the species, is distinguished from the typical form chiefly by its very long pedicels, from 5 to 10 cm. long, moreover by its broad, obtuse, frequently oval bracts, and large petals, to 1,6 cm. long, the apex often being more or less crenate. The ripe capsules are generally considerably shorter than the pedicels. All of the specimens gathered are nearly completely glabrous, as regards the stem and calyx, only the under side of the leaves being sparingly furnished with long, scattered hairs.

Distribution: Siberia, Dzungaria, Manchooria, China, Japan, Sakhalin.

Papaver nudicaule L. Spec. Pl. ed. II (1762) p. 725; Ledeb. Fl. Alt. II, p. 270; Turczan. Fl. Baical.-Dahur. (1842) p. 96, no. 89.

subspec. **xanthopetalum** (Trautv.) Fedde, *Papaverac.* in Engl. Pflanzenr. H. 40 (IV, 104, 1909) p. 379. *Papaver alpinum* α *nudicaule* Fisch. et Meyer, Ledeb. Fl. Alt. II, p. 270; Turczan. Cat. Baical. no. 92 ex parte; Ledeb.Fl. Ross. I, p. 87 ex parte. *Papaver nudicaule* subspec. *commune* var. *xanthopetalum* Trautv. Bull. Soc. Imp. Nat. Moscou XXXIII (1860)

p. 90; Бушъ, *Papaverac.* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 20. *Papaver alpinum* L. *β xanthopetalum* in Regel, Pl. Radd. (1861) p. 127, no. 152. *Papaver alpinum* L. Крым. Фл. Алт. I (1901) p. 51. *Papaver croceum* Ledeb. Fl. Alt. II, p. 271. [Tab. VI, Fig. 2].

Fig. 92. *Papaver nudicaule* L. subspec. *xanthopetalum* (Trautv.) Fedde. Different types of leaves. (1/1).

The specimens, which I refer to this subspecies, are distinguished by their large flowers, from 4, 5 to 6 cm. in diameter, altogether of the same brimstone colour. The

scape is from 15 to 25 cm. high, and beset with rough, ascending, rather stiff, scattered hairs, of a light yellowish brown colour. These hairs grow darker and denser towards the upper part of the scape, immediately below the flower. The flower-buds are nearly globular, and covered with rather dark, not glossy hairs. The filaments, at any rate in dried specimens, are of a greenish or bluish green colour. The petals are broadly obovate, or broadly triangular, the upper part cut off square, the margin more or less distinctly indented. The leaves are somewhat varying, generally about 10 cm. long, pinnately divided, with two pairs of lanceolate side pinnae, slightly tapering towards the summit. The terminal pinna generally of the same size as the side pinnae, but mostly somewhat broader. Sometimes the leaves may be nearly 2-pinnate, the primary lobes being pinnatifid or deeply indented. The leaves are covered, on the upper as well as on the under side, with long, rough, scattered hairs, of a light, nearly white colour. The petioles are mostly glabrous (f. *typicum* Fedde, l. c. p. 380). The plant is densely cespitose, surrounded at the base by withering rests of leaves, of a brownish colour.

Gathered in full flower in the Altaian, at an altitude of about 2100 m. above sea-level, at the end of July. Occurring there among mosses and lichens, on moist, shady slopes with a northern aspect, accompanying *Cardamine bellidifolia, Ranunculus frigidus, Valeriana capitata, Sedum Rhodiola, Salices*, etc.

Distribution: Northern portion of the central Asiatic territory, northern Mongolia, eastern and north-eastern Siberia to Kamtchatka.

Papaver somniferum L. Spec. Pl. ed. II (1762) p. 726; Крыл. Фл. Алт. I (1901) p. 52.

subspec. **setigerum** (DC.) Elk, Monogr. (1839) p. 30; Бушъ, *Papaverac.* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 18. *Papaver setigerum* DC. Fl. Franc. V (Suppl. 1815) p. 585; Fedde, *Papaverac.* in Engl. Pflanzenr. H. 40 (IV, 104, 1909) p. 342.

A few specimens of this one collected by me along the road between Karatus and Kushabar. In full flower in the middle of July.

Distribution: A native of the Mediterranean countries, Cyprus, Madeira, the Canary islands. Scattered in Siberia.

Corydalis pauciflora (Steph.) Pers. Synops. Plant. II (1807) p. 269; Ledeb. Fl. Alt. III, p. 240; Turczan. Cat. Baical. no. 97; Ledeb. Fl. Ross. I, p. 97 et 746; Turczan. Fl. Baical.-Dahur. (1842) p. 102, no. 92; Regel, Pl. Radd. (1861) p. 134, no. 163; Крыл. Фл. Алт. I (1901) p. 55; Бушъ, *Papaverac.* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 52.

Some specimens gathered by me in the Altaian, about the limit of tree vegetation, in moist, grass-grown places, near a mountain brooklet. Nearly past flowering at the end of July.

Distribution: Southern Siberia, northern Mongolia, the Caucasus, arctic America.

Cruciferae JUSS.

Lepidium apetalum Willd. Spec. Pl. III (1800) p. 439; Бушъ, *Papaverac.* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 90. *Lepidium micranthum* Ledeb. Fl. Ross. I, p. 205 et 765 ex parte (incl. var. *apetalum*); Karel. et Kiril. Enum. Pl. Fl. Alt. no. 112; Thellung, Gatt. *Lepid.* in Mitt. Bot. Mus. Univ. Zürich, 28 (1906) p. 131; Крыл. Фл. Алт. I (1901) p. 110. *Lepidium incisum* Ledeb. Fl. Alt. III, p. 193.

Occurring as a ruderal plant at and about Minusinsk, and scattered near habitations in the Urjankai country. With flower and fruits in June—August. This species is very nearly allied to *Lepidium ruderale*, being the European species, and *Lepidium apetalum* the one taking its place in Asia. By human agency, however, the geographical ranges of these plants have been confounded, so as to spread *Lepidium ruderale* over great parts of Siberia, eastwards to about Lake Baikal, while, on the other hand, *Lepidium apetalum* has also been introduced into Europe. Accordingly, both the species occur at Minusinsk.

Distribution: Southern Siberia, eastwards to China, Corea, Mongolia, the Himalayas, Tibet, Cashmere, Turkestan. Introduced into Russia, western Europe, and North America.

Lepidium ruderale L. Spec. Pl. ed. II (1763) p. 900; Ledeb. Fl. Alt. III, p. 195; Turczan. Cat. Baical. no. 177; Ledeb. Fl. Ross. I, p. 204 et 765 (excl. loc. Baikal et Davuriam); Turczan. Fl. Baical.-Dahur. (1842) p. 289, no. 169; Thellung, Gatt. *Lepid.* p. 135; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913), p. 94; Regel, Pl. Radd. (1861) p. 209, no. 246; Крыл. Фл. Алт. I (1901) p. 110.

Scattered as a weed in the streets of Minusinsk, and in the neighbourhood of that town. With flowers and fruits in June and July.

Distribution: Europe, and south-western Asia to the Himalayas and Tibet, Siberia to about Lake Baikal, South Africa, North and South America.

Lepidium crassifolium Waldst. et Kit. Pl. Rar. Hung. I (1799) p. 4; Ledeb. Fl. Alt. III, p. 185; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 109; Ledeb. Fl. Ross. I, p. 208 et 765; Крыл. Фл. Алт. I (1901) p. 112; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 97. *Lepidium cartilagineum* (I. Mayer) Thellung subspec. *crassifolium* Thellung, Gatt. *Lepid.* p. 153.

Rather common on the Abakan Steppe, near Ust Kamuishto, on saliferous soil, and on the banks of the salt-lake Tagarski osero. In flower and with young fruits in the second half of June. The specimens are beset with scattered hairs all over the stem. The basal leaves are oblong, or spatulate-oblong, and rather deeply indented, as is also the case in the lower stem-leaves. The specimens therefore much resemble var. *dentatum* (Boiss. et Ball.) Thellung, l. c. p. 155.

Distribution: Austro-Hungary to the west, through south-eastern Europe and

adjoining portions of Asia to Afghanistan, Turkestan and Baluchistan, Syria, south-western Siberia, eastwards to the Minusinsk district.

Lepidium latifolium L. Spec. Pl. ed. II (1763) p. 899; Ledeb. Fl. Alt. III, p. 189; Turczan. Cat. Baical. no. 178; Ledeb. Fl. Ross. III, p. 207; Turczan. Fl. Baical.-Dahur. (1842) p. 289, no. 170; Ledeb. Fl. Ross. I, p. 206 et 765; Thellung, Gatt. *Lepid.* p. 158; Крыл. Фл. Алт. I (1901) p. 111; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913). p6.6

subspec. **sibiricum** (Schweigg.) Thellung, l. c. p. 159 et 161; Бушъ, l. c. *Lepidium latifolium* var. *affine* C. A. Meyer in Ledeb. Fl. Alt. III, p. 189; Turczan. l. c. (1842) p. 290; Regel, Pl. Radd. (1861) p. 210, no. 247.

Young specimens, bearing only leaves and quite young flower-buds, taken by me on the salt-lake of Tagarski osero, south of Minusinsk, at the beginning of July. In the Urjankai country I have found the species past flowering and nearly withered on the steppes on the Ulu-kem at the end of August. The specimens gathered are distinguished by their rather large and broad leaves, which are sessile and nearly clasping the stem. The margin of the leaves entire, or only slightly and irregularly indented, the upper as well as the under side of the leaves and the stem rather densely puberulent.

Distribution: The species is distributed over southern and central Europe, North Africa, and temperate portions of Asia. The western parts of this area (Europe, North Africa and south-western Asia) are taken up by subspecies *eulatifolium*, while, on the other hand, the eastern parts (from Persia, Afghanistan, Tibet, and eastwards through southern Siberia, Mongolia, and China) are taken up by subspecies *sibiricum*. In boundary districts both forms occur growing together.

Lepidium cordatum Willd. ex Stev. apud DC. Syst. II (1821) p. 554; Ledeb. Fl. Alt. III, p. 186; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 110; Ledeb. Fl. Ross. I, p. 207 et 765; Крыл. Фл. Алт. I (1901) p. 111; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 104. *Lepidium latifolium* subspec *amplexicaule* var. *β cordatum* Thellung, l. c. p. 160 et 163.

On saliferous soil, on the Abakan Steppe, near Ust Kamuishto. Flowering and with young fruits in the second half of June. The specimens gathered are characteristic in having very narrow leaves, from 3 to 5 mm. broad, and the length to ten times the breadth, the margin rather deeply and sharply dentate, moreover, in having the stems generally unbranched, or only very slightly branched, frequently sparingly pubescent.

Distribution: The geographical range of this species is confined to south-western Siberia and adjoining regions of Dzungaria, Turkestan, and Mongolia. It was heretofore not observed farther to the east than the government of Tomsk.

Bunias orientalis L. Spec. Pl. ed. II (1763) p. 936; Ledeb. Fl. Ross. I, p. 226.

This species I have found as a weed in a corn-field by the road between Karatus

and Kushabar. It does not seem to have been previously observed in Siberia, and is not mentioned in any of the floras from there within my reach. KORSHINSKY also declares in Tentamen Florae Rossiae Orientalis, St. Petersburg 1898, p. 48: „Per Rossiam europaeam distributa; terminum orientalum (secus jugum Uralense) in ditione nostra attingens; deest in Sibiria et Turkestania." It probably belongs to the series of weeds nowadays spreading over Siberia by the improved means of intercourse.

Distribution: From the Orient and European Russia the species seemed to be wandering westwards through Europe, where it is known from middle and northern Europe up to southern Scandinavia, as well as eastwards through Siberia, where I have found it as for east as the government of Yeniseisk.

Thlaspi arvense L. Spec. Pl. ed. II (1763) p. 901; Ledeb. Fl. Alt. III, p. 94; Turczan. Cat. Baical. no. 149; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 81; Ledeb. Fl. Ross. I, p. 162 et 756; Turczan. Fl. Baical.-Dahur. (1842) p. 263, no. 141; Regel, Pl. Radd. (1861) p. 201, no. 225; Крыл. Фл. Алт. I (1901) p. 87; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 110.

The species varies considerably in the height and ramification of the stem, and in the size, length and breadth of the leaves, the margin of which is sometimes entire, or more or less distinctly serrulate. In point of the shape of the young fruits the specimens collected really seemed to have to be referred to f. *typicum* BUSCH (Rhoead. in Fl. Cauc. Crit. III, 4 (1908) p. 157), though other specimens have more orbicular fruits, and the summits more broadly incised, so as to make them look more like f. *baicalense* (DC.) C. A MEYER, Verz. Cauc. (1831) p. 184.

These two forms therefore seemed to pass into each other. According to LEDEB. Fl. Alt. III, p. 94, the latter form is not invariable when cultivated, either. The species is scattered as a weed over the traversed regions of southern Siberia, on the borders of fields, etc., on the Abakan Steppe, between Minusinsk and Kushabar, as well as in the Urjankai country, where found by me near Ust Sisti-kem and at Ust Uss. Taken with flowers and young fruits in June and the first half of July.

Distribution: Throughout Europe, south-western Asia, through the Thian-Shan, Pamir, and the Himalayas to China, southern Siberia and northern Mongolia, North Africa. Introduced into North America.

Sisymbrium officinale (L.) Scop. Fl. Carniol. ed. II, 2 (1772) p. 26; Ledeb. Fl. Ross. I, p. 176 et 759; Крыл. Фл. Алт. I (1901) p. 92; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 138.

As a weed near Ust Abakansk. Only young specimens bearing flower-buds at the end of June.

Distribution: Europe, except the extreme north, Asia Minor, Syria, south-western Siberia to the government of Yeniseisk, the Amoor Province, North Africa. Introduced into North America and Australia.

Sisymbrium heteromallum C. A. Meyer in Ledeb. Fl. Alt. III, p. 132; Turczan. Cat. Baical. no. 160; Ledeb. Fl. Ross. I, p. 178; Turczan. Fl. Baical.-Dahur. (1842) p. 273, no. 152; Крыл. Фл. Алт. I (1901) p. 93; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 142.

On an islet in the river Abakan, near Ust Abakansk, in stony and sandy places. With flowers at the end of June.

Distribution: In middle Asia from Turkestan and Afghanistan, Pamir, Tibet, Mongolia, southern Siberia, northern China, northern Corea.

Sisymbrium junceum Marsch.-Bieb. Fl. Tauro-Cauc. II (1808) p. 114 et III (1819) p. 440; Ledeb. Fl. Alt. III, p. 127; Turczan. Cat. Baical. no. 159; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 88; Ledeb. Fl. Ross. I, p. 177 et 759; Turczan. Fl. Baical.-Dahur. (1842) p. 272, no. 151; Regel, Pl. Radd. (1861) p. 203, no. 234; Крыл. Фл. Алт. I (1901) p. 93; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 145.

The specimens collected are distinguished by their very long and narrow leaves, the lower ones linear, from 1 to 1,3 mm. broad, and from 4 to 7 cm. long, the upper ones linear-filiform, 0,3 mm. broad, and from 3 to 4 cm. long, more or lesse acuminate at the summit. The leaves are entire; only some of the lower ones having one or a few awl-shaped teeth about the middle of the leaf. The plant is glabrous all over, the sepals included. In point of their narrow leaves these specimens recall in a high degree var. *soongoricum* Regel-Herder in Bull. Soc. Imp. Nat. Moscou (1864) p. 141, no. 98 b, and in point of their completely glabrous sepals var. *latifolium* Korsh. in Fragm. Fl. Turk. I (1898) p. 412, no. 24. The stems are solitary, unbranched in the lower part, and in the upper part with one or a few short branches, only 1 to a few cm. long. The petals are small, from 5 to 6 mm. long. Taken on the Abakan Steppe, near Ust Kamuishto. In full bloom in the second half of June.

Distribution: In middle Europe from Hungary to the west, through southern and middle Russia and adjoining portions of Asia to Turkestan, Siberia, and Trans Baikal, northwards and eastwards right up to the Upper Lena and the Upper Kolyma.

Sisymbrium Sophia L. Spec. Pl. ed. II (1763) p. 920; Ledeb. Fl. Alt. III, p. 135; Ledeb. Fl. Ross. I, p. 180 et 760; Turczan. Cat. Baical. no. 161; Turczan. Fl. Baical.-Dahur. (1842) p. 274, no. 153; Regel, Pl. Radd. (1861) p. 203, no. 235; Крыл. Фл. Алт. I (1901) p. 94; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 148.

In the territory explored, the species varies very considerably in hairiness, ramification, height, and above all, in the size of the leaves, and the breadth of the segments. In dry places, for instance in the steppe regions about the river Abakan, the segments are generally very fine, almost filiform, and like the plant in general, rather densely hairy, whereas, in humid habitats, besides being more vigorous in growth, having considerably broader segments as well; breadth of the lobes to 2 mm. in the specimens gathered, and the whole plant glabrous, and of a fresher green. The species is rather

common in the Minusinsk district, for instance on the islets in the lower part of the river Abakan, near Askys, Ust Kamuishto, Ust Abakansk, along road-sides, etc., in several places between Minusinsk and Kushabar, where rather frequently to be met with in the streets, on the river Amyl, near Petropawlowsk, and in the Urjankai country, near Kamsara, and at Ust Tara-kem. Taken flowering and with young fruits in June and July.

Distribution: Europe, except the extreme northern portions, western and central Asia to India and Tibet southwards, and the Pacific Ocean eastwards. Rather common in the taiga and steppe regions of Siberia, scattered in Mongolia and China, Japan, North Africa. Introduced into North America.

Sisymbrium salsugineum Pallas, Reise Verschied. Statthaltersch. Russ. Reiches, p. 466 et 740; Ledeb. Fl. Alt. III, p. 145; Turczan. Cat. Baical. no. 164; Ledeb. Fl. Ross. I, p. 185; Turczan. Fl. Baical.-Dahur. (1842) p. 275, no. 155; Крыл. Фл. Алт. I (1901) p. 95. *Arabidopsis salsugineum* (Pallas) Busch, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 136.

On saliferous soil, on the Abakan Steppe, near Ust Kamuishto. Nearly past flowering in the second half of June.

Distribution: South-eastern Russia, Russian Turkestan, southern Siberia, eastwards to Trans Baikal and Yakutsk.

Isatis costata C. A. Meyer in Ledeb. Fl. Alt. III, p. 204; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 116; Ledeb. Fl. Ross. I, p. 211 et 766; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 160.

f. lasiocarpa (Ledeb.) Busch, l. c. *Isatis lasiocarpa* Ledeb. Fl. Ross. I, p. 211 et 767; Крыл. Фл. Алт. I (1913) p. 113. *Isatis hebecarpa* C. A. Meyer in Ledeb. Fl. Alt. III, p. 205 (excl. syn.). *Isatis costata* f. *hebecarpa* Ledeb. Fl. Ross. I, p. 211.

On dry rocky slopes on the river, near Minusinsk; with flowers at the end of June.

Distribution: South-eastern Russia, Russian Turkestan, southern Siberia (southern portions of the governments of Tomsk and Yeniseisk), northern Mongolia.

Sinapis alba L. Spec. Pl. ed. II (1763) p. 934; Ledeb. Fl. Ross. I, p. 218; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 164.

On the Abakan Steppe, near Askys, in the neighbourhood of cultivated places. With young flowers and flower-buds about the middle of June.

Distribution: Europe, Caucasia, south-western Asia, India, Tibet, southern Siberia (the governments of Tobolsk, Yeniseisk, and Yakutsk), the Canary Islands, North America (introduced).

Brassica campestris L. Spec. Pl. ed. II (1763) p. 931; Ledeb. Fl. Alt. III, p. 212; Turczan. Cat. Baical. no. 183; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 122; Turczan. Fl. Baical.-Dahur. (1842) p. 293, no. 174; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913)

p. 170. *Brassica Rapa* Ledeb. Fl. Ross. I, p. 216 et 769. *Brassica Rapa* var. *campestris* G. Koch, Regel, Pl. Radd. (1861) p. 211, no. 249; Крыл. Фл. Алт. I (1901) p. 116.

As a weed in fields here and there along the road-side between Minusinsk and Kushabar. In flower and with young fruits at the beginning of July.

Distribution: Europe, except the extreme north, south-western Asia, southern Siberia from the Ural to Kamtchatka, northern Mongolia, China, Japan, Mesopotamia, Syria, Arabia, North Africa.

Brassica juncea (L.) Czern. Comp. Charkov. (1859) p. 8; Крыл. Фл. Алт. I (1901) p. 117; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 178.

As a weed near Ust Abakansk. In full flower at the end of June.

Distribution: South-eastern portion of Russia, and adjoining portions of Asia, the Thian-Shan, Dzungaria, Afghanistan, India, south-western Siberia, Mongolia, eastern Asia, Japan, North Africa.

Brassica Napus L. Spec. Pl. ed. II (1763) p. 931; Ledeb. Fl. Ross. I, p. 217 et 769; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. I (1913) p. 174.

In fields on the road between Minusinsk and Kushabar; flowering and with nearly ripe pods about the middle of July.

Distribution: Europe and south-western Asia to about the Thian-Shan, southern Siberia.

Barbarea stricta Andrz. in Besser, Enum. Pl. Volh. (1822) p. 72; Ledeb. Fl. Ross. I, p. 115; Turczan. Fl. Baical.-Dahur. (1842) p. 229, no. 104; Крыл. Фл. Алт. I (1901) p. 65; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 187. *Barbarea vulgaris* R. Br. *β stricta* Regel, Pl. Radd. (1861) p. 155, no. 173.

In the specimens gathered, the side pinnae of the radical leaves are wanting, the terminal pinna thus alone constituting the leaf, being very large, and gradually tapering towards the petiole, and being more narrow at the base than is usually the case in Scandinavian specimens. On the river Amyl, near Kushabar, and near Kalna, in moist meadows, and on the Upper Sisti-kem. Specimens taken here at an altitude of 1500 m. above sea-level, July 25th; nearly past flowering.

Distribution: Europe, except the south-western portions, and adjoining portions of Asia to Turkestan, southern Siberia, eastwards to about Lake Baikal.

Barbarea arcuata Reichenb. in Bot. Ztg. (1820); Ledeb. Fl. Alt. III, p. 11; Turczan. Cat. Baical. no. 109; Ledeb. Fl. Ross. I, p. 115 et 748 (excl. locos Sibiriam baical., inter Aldan et Ochotzk et ins. Sitcham.); Turczan. Fl. Baical.-Dahur. (1842) p. 228, no. 102; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 192. *Barbarea vulgaris* var. *arcuata* apud Regel, Pl. Radd. (1861) p. 157, no. 176; Крыл. Фл. Алт. I (1901) p. 66.

subspec. **typica** Busch, Rhoead. (1909) p. 313.

Rather common on the low islets grown with brush-wood in the Yenisei, near Ust Abakansk, where taken by me in full flower at the beginning of June. The specimens are completely glabrous.

Distribution: Europe, except the extreme north, Caucasia and south-western Asia to the Thian-Shan, eastern Turkestan, Tibet and the Himalayas, southern Siberia to Lake Baikal, southern Mongolia.

Nasturtium palustre DC. Syst. II (1821) p. 191; Ledeb. Fl. Alt. III, p. 8; Turczan. Cat. Baical. no. 104; Ledeb. Fl. Ross. I, p. 112; Turczan. Fl. Baical.-Dahur. (1842) p. 226, no. 99; Regel, Pl. Radd. (1861) p. 151, no. 173; Крыл. Фл. Алт. I (1901) p. 64; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 201. *Nasturtium densiflorum* Turczan. Cat. Baical. no. 105; Turczan. Fl. Baical.-Dahur. (1842) p. 226, no. 100.

It appears from the material collected that the species varies considerably, especially in the shape and size of the silicle and the form and incisions of the leaves. The terminal lobe of the leaf is always comparatively small, narrowly triangular in outline, and tapering towards the summit, by which characters all the Siberian specimens in my collections are distinguished. The auricles vary much in size, and so do the petioles in length. In many specimens the upper cauline-leaves are also markedly petioled. The sepals in the Siberian specimens are frequently furnished with rather long, white, intricate hairs, which is an especially predominant character in the quite young flower-buds. Such hairy sepals are to be found in some Scandinavian specimens as well, but not so commonly or so predominantly as is the case in the Siberian ones. A similar hairiness may also occur in the auricles, and, exceptionally, along the greatest nerves of the leaves. As for the rest, the plants are completely glabrous. The species is very common in the Minusinsk district, where collected on swampy river-banks, along the Yenisei and Abakan rivers, on islets in the said rivers, near Kushabar, and on the banks of the river Amyl, on the Sisti-kem, and at Ust Tara-kem. The species begins flowering here in the first half of June.

Distribution: Nearly all over Europe, Caucasia, south-western Asia, Turkestan, Siberia, the Himalayas, India, Mongolia, eastern Asia, Sakhalin, Japan, North Africa, America, Greenland, New Zealand.

Armoracia sisymbrioides (DC.) Cajand. Alluv. (1903) p. 33; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 219. *Cochlearia sisymbrioides* DC., Ledeb. Fl. Ross. I, p. 158; Крыл. Фл. Алт. I (1901) p. 86. *Cochlearia grandiflora* DC., Turczan. Cat. Baical. no. 148; Turczan. Fl. Baical.-Dahur. (1842) p. 261, no. 140; Ledeb. Fl. Ross. I, p. 159; Regel, Pl. Radd. (1861) p. 200, no. 223.

Scattered on the islets in the river Abakan, especially in moist, grass-grown fields, near stagnant water; with flowers and young fruits in the middle of June.

Distribution: Southern Siberia, from the government of Tobolsk to Trans Baikal to the east, Sakhalin.

Cardamine tenuifolia (Ledeb.) Turczan. Index in Bull. Soc. Imp. Nat. Moscou (1837, I) p. 57, no. 38; Turczan. Cat. Baical. no. 120; Turczan. Fl. Baical.-Dahur. (1842) p. 238, no. 114; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 231. *Dentaria microphylla* Georgi, Ledeb. Fl. Ross. I, p. 130 (non Willd.). *Dentaria tenuifolia* Ledeb. Fl. Alt. III, p. 43; Ledeb. Fl. Ross. I, p. 130; Крыл. Фл. Алт. I (1901) p. 72.

In moist, grass-grown places on the river Abakan, near Askys. Flowering in June.

Distribution: Middle Russia (Perm, Tula), Siberia, from the Altai to Kamtchatka, Manchooria, Sakhalin.

Cardamine macrophylla Willd. Spec. Pl. III, p. 484; Ledeb. Fl. Alt. III, p. 38; Turczan. Cat. Baical. no. 124; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 64; Ledeb. Fl. Ross. I. p. 128 et 750; Turczan. Fl. Baical.-Dahur. (1842) p. 240, no. 118; Крыл. Фл. Алт. I (1901) p. 72; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 236. *Dentaria macrophylla* W., Regel, Pl. Radd. (1861) p. 176, no. 194.

Rather frequent in the subalpine wooded regions in the Sayansk mountains, between Kushabar and Ust Algiac, on the Sisti-kem, especially in boggy and moist, grass-grown places. Collected in full flower and with half ripe fruits about the middle of July. Colour of the flowers light red, almost white. The fruits are beset with rather stiff, white, scattered hairs, f. *eriocarpa* Busch, l. c.

Distribution: The Ural (Perm), Siberia to Kamtchatka, northern Mongolia, Sakhalin.

Cardamine impatiens L. Spec. Pl. ed. II (1763) p. 914; Ledeb. Fl. Alt. III, p. 40; Ledeb. Fl. Ross. I, p. 128 et 750; Крыл. Фл. Алт. I (1901) p. 71; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 242.

var. **communis** Busch, l. c. p. 243.

In moist, shady places, on the banks of a brook, near Kushabar. In full flower in the middle of June.

Distribution: Europe, except the extreme northern, western, and southern portions, through south-western and middle Asia, eastwards to China and Manchooria, Japan, Sakhalin.

Cardamine pratensis L. Spec. Pl. ed. II (1763) p. 915; Ledeb. Fl. Alt. III, p. 37; Turczan. Cat. Baical. no. 123; Ledeb. Fl. Ross. I, p. 125; Turczan. Fl. Baical.-Dahur. (1842) p. 240, no. 117; Regel, Pl. Radd. (1861) p. 175, no. 192; Крыл. Фл. Алт. I (1901) p. 71; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 258.

Rather common in the territory explored, especially on river-banks, in moist meadows, etc., on the islets in the rivers Abakan and Yenisei as well as on the banks, where collected by me in full flower in June. Most of the specimens belong to f. *typica* Maxim. (Bull. Ac. 18 (1873) p. 278). Near Askys I have taken some specimens belonging to a form with small pinnae, only from 3 to 5 mm. in diameter, and with petals

from 5 to 6 mm. long, f. *parvifolia* Wimm.-Grab. Fl. Siles. II (1829) p. 266. Besides, I have also found the species to be rather frequent in the Urjankai country, for instance near Ust Sisti-kem, the Kamsara, and Ust Tara-kem.

Distribution: Nearly all over Europe, except the extreme south, Siberia, northern Mongolia, eastern Asia, North America, Greenland.

Cardamine bellidifolia L. Spec. Pl. ed. II (1763) p. 913; Ledeb. Fl. Ross. I, p. 123; Regel, Pl. Radd. (1861) p. 170, no. 188; Крыл. Фл. Алт. I (1901) p. 70; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 268. *Cardamine lenensis* Andrz. apud Ledeb. Fl. Alt. III, p. 33; Turczan. Cat. Baical. no. 118; Ledeb. Fl. Ross. I, p. 123; Turczan. Fl. Baical.-Dahur. (1842) p. 237, no. 113.

In the Altaian, at an altitude of about 2000 m. above sea-level, especially on moist, shady slopes with a northern aspect, among moss and lichens, accompanying *Papaver nudicaule* subspec. *xanthopetalum*, *Ranunculus frigidus*, *Valeriana capitata*, *Alsine arctica*, etc. In flower and with young fruits at the end of July. All of the specimens collected belong to f. *genuina* Busch, l. c. They are large and vigorous, and agree perfectly with the specimens from Norway, with which I have made a comparison. The petiole generally considerably longer than the orbicular, ovate, or cordiform blade, the summit of which is either rounded, or sometimes finely subacute. The stem is 2—8 cm. long, overtopping the leaves, and generally furnished with a single cauline-leaf.

Distribution: Arctic Europe and Asia, the Altai, the Sayansk district, Trans Baikal mountains, North America.

Arabis hirsuta (L.) Scop. Fl. Carn. ed. II, 2 (1772) p. 30; Ledeb. Fl. Alt. III, p. 23; Turczan. Cat. Baical. no. 113; Ledeb. Fl. Ross. I, p. 118; Turczan. Fl. Baical.-Dahur. (1842) p. 232, no. 108; Regel, Pl. Radd. (1861) p. 160, no. 182; Крыл. Фл. Алт. I (1901) p. 67.

Rather common in the territory explored, where especially occurring in dry meadows and on mountain slopes. The species is here much varying in the form and size of the leaves, height of the stem, and floweriness, as well as in the density of the hairs. The specimens generally seemed to be distinguished by comparatively long and fine pedicels, generally from 1 to 1,4 cm. long about the time of ripening of the fruit. The species begins flowering at the end of May.

Distribution: Europe, the wood and steppe regions of Siberia, the Altai, the Sayansk district, Trans Baikal, eastern Asia, North America.

Arabis incarnata Pallas in herb. Lambert ex DC. Syst. II, p. 210; Ledeb. Fl. Alt. III, p. 22; Turczan. Cat. Baical. no. 114; Ledeb. Fl. Ross. I, p. 119; Turczan. Fl. Baical.-Dahur. (1842) p. 233, no. 109; Крыл. Фл. Алт. I (1901) p. 68.

Scattered on dry, rocky declivities on the Abakan Steppe, near Ust Kamuishto, where collected by me, flowering and with partly ripe fruits in the second half of June.

The petals are partly pink, partly nearly white. Also found by me in similar situations at Kushabar, near the river Amyl, and near the Dora Steppe.

Distribution: From the Altai to the west, through southern Siberia and northern Mongolia to the Khingan mountains to the east.

Arabis pendula L. Spec. Pl. ed. II (1763) p. 930; Ledeb. Fl. Alt. III, p. 25; Turczan. Cat. Baical. no. 116; Ledeb. Fl. Ross. I, p. 122; Turczan. Fl. Baical.-Dahur. (1842) p. 235, no. 111; Regel, Pl. Radd. (1861) p. 169, no. 186; Крыл. Фл. Алт. I (1901) p. 68.

By the road-side, near Kushabar. With young flowers in the first half of July.

Distribution: Middle Russia, Siberia, Mongolia, the Thian-Shan, the Altai, eastern Asia, Sakhalin, Japan.

Turritis glabra L. Spec. Pl. ed. II (1763) p. 930; Ledeb. Fl. Alt. III, p. 15; Turczan. Cat. Baical. no. 111; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 60; Ledeb. Fl. Ross. I, p. 116; Turczan. Fl. Baical.-Dahur. (1842) p. 231, no. 106; Regel, Pl. Radd. (1861) p. 160, no. 181; Крыл. Фл. Алт. I (1901) p. 66.

Scattered as a weed in fields on the road between Minusinsk and Kushabar; flowering in July.

Distribution: Europe, south-western and middle Asia, southern Siberia, eastern Asia, North America, Australia.

Macropodium nivale R. Br. in Hort. Kew. ed. II, IV, p. 108; Ledeb. Fl. Alt. III, p. 32; Turczan. Cat. Baical. no. 117; Ledeb. Fl. Ross. I, p. 132; Turczan. Fl. Baical.-Dahur. (1842) p. 236, no. 112; Крыл. Фл. Алт. I (1901) p. 74.

In the Altaian, in alpine tracts, near the perennial snow, on cliffs, among moss and lichens. With flower-buds and some fully opened flowers at the end of July.

Distribution: The Altai to the west, through the Sayansk district to Trans Baical and northern Mongolia.

Alyssum lenense Adams, Mem. Soc. Nat. Moscou V, p. 110; Turczan. Cat. Baical. no. 127; Turczan. Fl. Baical.-Dahur. (1842) p. 246, no. 123; Regel, Pl. Radd. (1861) p. 179, no. 198; Крыл. Фл. Алт. I (1901) p. 76. *Alyssum altaicum* C. A. Meyer in Ledeb. Fl. Alt. III, p. 55. *Alyssum Fischerianum* DC., Turczan. Cat. Baical. no. 125; Ledeb. Fl. Ross. I, p. 138; Regel, l. c. p. 179. *Odontarrhena Fischeriana* C. A. Meyer in Turczan. Fl. Baical.-Dahur. (1842) p. 245, no. 122.

On the Abakan Steppe, near Askys, on dry, Devonian cliffs of sandstone, with ripe fruits in the middle of June, and on dry cliffs on the Kamsara and the Tara-kem, with fruits in August.

Distribution: South-eastern Russia (about the mouth of the Volga), Turkestan, northern Mongolia, southern Siberia from the Ural towards Manchooria.

Alyssum alpestre L. Mant. p. 92; Regel, Pl. Radd. (1861) p. 180, no. 201; Крыл. Фл. Алт. I (1901) p. 77. *Odontarrhena alpestris* Ledeb. Fl. Ross. I, p. 142. *O. tortuosa*

Fig. 93. *Macropodium nivale* R. Br. (1/1).

Turczan. Fl. Baical.-Dahur. (1842) p. 244, no. 121. *O. obovata* C. A. Meyer in Ledeb. Fl. Alt. III, p. 61; Ledeb. Fl. Ross. I, p. 142; *O. microphylla* C. A. Meyer in Ledeb. Fl. Alt. III, p. 63; Ledeb. Fl. Ross. I, p. 143. *Alyssum tortuosum* in Turczan. Cat. Baical. no. 126.

Occurring especially in gravelly, sandy places, on mountain slopes, etc., on the steppes between Minusinsk and Ust Abakansk, and scattered on the Abakan Steppe, between Ust Abakansk and Askys. In full flower, and with a few ripe pods in the first half of June.

Distribution: Southern Europe, the Caucasus, south-western Asia, Turkestan, southern Siberia and northern Mongolia, Manchooria.

Draba nemorosa L. Spec. Pl. ed. I (1753) p. 643; Turczan. Cat. Baical. no. 145; Ledeb. Fl. Ross. I, p. 154 et 756; Turczan. Fl. Baical.-Dahur. (1842) p. 260, no. 138; Regel, Pl. Radd. (1861) p. 198, no. 220; Крыл. Фл. Алт. I (1901) p. 85.

f. *leiocarpa* Ledeb. l. c. *Draba lutea* Gilib., Ledeb. Fl. Alt. III, p. 83; Turczan. l. c. p. 259, no. 157; Regel, l. c.

On an islet in the Yenisei, near Ust Abakansk, in dry, sandy meadow, in abundance; in flower and with ripe fruits at the beginning of June. In the Urjankai country, near Ust Tara-kem, on dry steppe meadows, and in dry, open larch-forest.

Distribution: Middle and south-eastern Europe, the Caucasus, south-western Asia, Tibet, Siberia, Mongolia, China, Corea, Japan, North America.

Hesperis natronalis L. Spec. Pl. ed. II (1763) p. 927; Ledeb. Fl. Ross. I, p. 171 et 759; Regel, Pl. Radd. (1861) p. 202, no. 229; Крыл. Фл. Алт. I (1901) p. 89. *Hesperis sibirica* L., Ledeb. Fl. Alt. III, p. 115; Turczan. Cat. Baical. no. 153; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 87; Turczan. Fl. Baical.-Dahur. (1842) p. 267, no. 145.

On grassy hills, in *Caragana* thickets, on the steppes between Minusinsk and Ust Abakansk, where collected with young flowers at the beginning of June. In the Urjankai contry, near Ust Sisti-kem. The leaves of the specimens taken are either entire, or more or less deeply indented.

Distribution: Europe, Caucasia and south-western Asia to Turkestan, Siberia, eastwards to about Trans Baikal and the government of Yakutsk, northern Mongolia.

Dontostemon micranthus C. A. Meyer in Ledeb. Fl. Alt. III, p. 120; Ledeb. Fl. Ross. I, p. 174; Turczan. Fl. Baical.-Dahur. (1842) p. 268, no. 147; Крыл. Фл. Алт. I (1901) p. 91. *Andrzejowskia parviflora* in Turczan. Cat. Baical. no. 155.

Scattered on the Abakan Steppe, near Ust Kamuishto, especially on rocky slopes, where collected by me with young flowers about the middle of June.

Distribution: Through southern Siberia, from the Altai to Trans Baikal, northern Mongolia.

Erysimum altaicum C. A. Meyer in Ledeb. Fl. Alt. III, p. 153; Turczan. Cat. Baical. no. 165; Ledeb. Fl. Ross. I, p. 188; Turczan. Fl. Baical.-Dahur. (1842) p. 276, no. 156; Крыл. Фл. Алт. I (1901) p. 97. *Erysimum Cheiranthus* Pers., Regel, Pl. Radd. (1861) p. 204, no. 238.

The specimens collected vary between 25 and 35 cm. in height. The leaves narrow, 2 to 2,5 mm. broad, and 4 to 8 cm. long, conduplicate, so as to give them an appearance of being only about 1 mm. broad, always completely entire, with short, appressed hairs. The pedicels 2 to 4 mm. long, only about half the length of the calyx. The whole plant of a light yellowish green. Rather common on the Abakan Steppe, especially in open, grass-grown places, on mountain slopes, etc., where to be met with in full flower, here and there already past flowering at the beginning of June.

Distribution: The Caucasus (on Mount Elbruz up to 8000 ft. above sea-level), Russian Turkestan, southern Siberia, from the government of Tomsk to Trans Baikal, northern Mongolia.

Erysimum cheiranthoides L. Spec. Pl. ed. II (1763) p. 923; Ledeb. Fl. Alt. III, p. 155; Turczan. Cat. Baical. no. 166; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 99; Ledeb. Fl. Ross. I, p. 189; Turczan. Fl. Baical.-Dahur. (1842) p. 277, no. 157; Regel, Pl. Radd. (1861) p. 206, no. 239; Крыл. Фл. Алт. I (1901) p. 98.

On the Abakan Steppe, near Askys, in the neighbourhood of cultivated fields and waste places; with flowers and young fruits in the middle of June. I have also collected the species in thickets, near Kushabar, and near Ust Sisti-kem.

Distribution: Europe, Siberia from the Ural to the Pacific Ocean, northern Mongolia, eastern Asia, Sakhalin, North Africa, and North America (introduced?).

Erysimum hieraciifolium L. Spec. Pl. ed. II (1763) p. 923; Крыл. Фл. Алт. I (1901) p. 98. *Erysimum virgatum* in Ledeb. Fl. Alt. III, p. 156; Turczan. Cat. Baical. no. 167; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 98; Turczan. Fl. Baical.-Dahur. (1842) p. 278, no. 158; Regel, Pl. Radd. (1861) p. 206, no. 241. *Erysimum Marschallianum* in Ledeb. Fl. Alt. III, p. 158; Ledeb. Fl. Ross. I, p. 189 et 761. *Erysimum strictum* in Ledeb. Fl. Ross. I, p. 189.

Scattered on the Abakan Steppe and in its environs, in dry, grass-grown places, where I have gathered it with young flowers about the middle of June. This species occurs here in a form especially characterized by its narrow, narrowly lanceolate to linear leaves. In the Urjankai country I have found the species near the Kamsara.

Distribution: Europe, Caucasia, south-western Asia, the Himalayas, Siberia, from the Ural to Trans Baikal, northern Mongolia, North America.

Camelina microcarpa Andrz. in DC. Syst. II, p. 517 et in Prodrom. I, p. 201; Ledeb. Fl. Alt. III, p. 177; Turczan. Cat. Baical. no. 176; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 106; Ledeb. Fl. Ross. I, p. 196 et 764; Turczan. Fl. Baical.-Dahur. (1842) p. 288, no. 168; Крыл. Фл. Алт. I (1901) p. 104.

Dispersed in the tracts about the river Abakan, in sandy meadows, in open brushwood, along borders of fields, etc. Flowering and with partly ripe fruits about the middle of June.

Distribution: Europe, except the northern regions, south-western Asia to Persia and Turkestan, southern Siberia, eastwards to about Lake Baikal.

Capsella bursa-pastoris (L.) Moench, Meth. (1794) p. 271; Ledeb. Fl. Alt. III, p. 198; Turczan. Cat. Baical. no. 179; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 114; Ledeb. Fl. Ross. I, p. 199 et 764; Turczan. Fl. Baical.-Dahur. (1842) p. 290, no. 171; Regel, Pl. Radd. (1861) p. 201, no. 227; Крыл. Фл. Алт. I (1901) p. 106.

As a weed in corn-fields, along road-sides, etc., very common between Minusinsk and Kushabar, in farm-yards in the Amyl taiga, at Ust Algiac, Ust Sisti-kem, near the Kamsara, and about the Dora Steppe. Flowering the whole summer.

Distribution: As a weed nearly all over the globe.

Raphanus Raphanistrum L. Spec. Pl. ed. II (1763) p. 935; Бушъ, *Cruciferae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 183. *Raphanistrum innocuum* Murr., Ledeb. Fl. Ross. I, p. 225 (non 771).

As a weed scattered in fields on the road between Minusinsk and Kushabar; a few specimens I have also found in fields, near Ust Sisti-kem, nearly past flowering and with ripe fruits in the second half of August.

Distribution: Europe, northern Asia, North America (naturalized from Europe).

Droseraceae DC.

Drosera rotundifolia L. Spec. Pl. ed. II (1762) p. 402; Turczan. Cat. Baical. no. 206; Ledeb. Fl. Ross. I, p. 261 et 773; Turczan. Fl. Baical.-Dahur. (1842) p. 309, no. 195; Regel, Pl. Radd. (1861) p. 502, no. 267; Крыл. Фл. Алт. I (1901) p. 128; Diels, *Droseraceae* in Engl. Pflanzenr. H. 26 (IV, 112, 1906) p. 93.

On *Sphagnum*-swamps in the Amyl valley and on the Sisti-kem, between Ust Algiac and Tshebertash. In full flower at the beginning of August.

Distribution: Europe, Siberia to Kamtchatka, Sakhalin, Japan, North America, Greenland.

Drosera anglica Huds. Fl. Angl. ed. II (1778) p. 135; Turczan. Cat. Baical. no. 207; Крыл. Фл. Алт. I (1901) p. 129; Diels, *Droseraceae* in Engl. Pflanzenr. H. 26 (IV, 112, 1906) p. 96. *D. longifolia* L. Spec. Pl. ed. II (1762) p. 403 pro parte; Ledeb. Fl. Ross. I, p. 261; Turczan. Fl. Baical.-Dahur. (1842) p. 309, no. 196; Regel, Pl. Radd. (1861) p. 503, no. 268.

Scattered on *Sphagnum*-swamps in the subalpine taiga territory on the Amyl.

Distribution: Subarctic parts of Europe and Asia, in Siberia eastwards to Kamtchatka, Sakhalin, Japan, North America, the Sandwich Islands.

Drosera intermedia Hayne in Schrader's Neues Journ. I (1800) p. 37; Ledeb. Fl. Ross. I, p. 262; Diels, *Droseraceae* in Engl. Pflanzenr. H. 26 (IV, 112, 1906) p. 83.

In *Sphagnum*-swamps in the Amyl valley.

Distribution: Europe, southern Siberia, North America, the West Indies.

Crassulaceae DC.

Bulliarda aquatica (L.) DC. in Bull. Soc. Philom. no. 49, p. 1 et Prodrom. III (1828) p. 382; Ledeb. Fl. Ross. II, p. 172.

On an islet in the river Abakan, near the mouth, on moist river-banks etc. The species seemed to be very rare in Siberia, or has at any rate been overlooked.

Distribution: Europe, southern Siberia (Minusinsk), North America.

Sedum quadrifidum Pallas, Reise Russ. Reich. III, p. 25, 33 et 316, app. p. 730, no. 90; Ledeb. Fl. Alt. II, p. 196; Turczan. Cat Baical. no. 476; Ledeb. Fl. Ross. II, p. 177; Turczan. Fl. Baical.-Dahur. (1844) p. 247, no. 465; Maximowicz, *Crassulac.* Asiae Orient. p. 729 (Mel. Biol. B. XI); Крыл. Фл. Алт. II (1903) p. 455.

In the Altaian, above the limit of tree vegetation, at an altitude of about 1900 m. above sea-level, among sand and gravel. Flowering, and partly past flowering at the end of July. The specimens taken are from 6 to 7 cm. high; the stamens somewhat shorter, more rarely of the same length as the petals.

Distribution: Northern Russia, the Thian-Shan, Turkestan, Tibet, the Himalayas, the Altai, the Sayansk district, northern Mongolia.

Sedum Rhodiola (L.) DC. Prodrom. III (1828) p. 401; Ledeb. Fl. Alt. II, p. 194 in nota; Turczan. Cat. Baical. no. 470; Ledeb. Fl. Ross. II, p. 179; Maxim. *Crassulac.* Asiae Orient. p. 734; Крыл. Фл. Алт. II (1903) p. 456. *Sedum elongatum* Ledeb. Fl. Alt. II, p. 193; Turczan. Fl. Baical.-Dahur. (1844) p. 243, no. 461.

In the Altaian, at altitudes of about 2000 m. above sea-level, on moist and shady slopes with a northern aspect, in places grown with mosses and lichens, accompanying *Cardamine bellidifolia, Papaver nudicaule* var. *xanthopetalum, Valeriana capitata, Ranunculus fridigus,* etc. In full flower at the end of June.

The leaves in the specimens collected, especially the upper ones, are comparatively narrow, nearly lanceolate, or more equally narrow throughout their length, to 30 mm. long, and 6 mm. broad, the summit rather sharply pointed, the margin in the upper half rather deeply indented. Thus, it agree rather perfectly with *β elongatum* MAXIM.

Distribution: Northern and arctic regions of Europe, alpine regions of the middle Europe, northern Asia to Kamtchatka, Turkestan, the Altai, the Sayansk district, the government of Irkutsk and Trans Baikal, Yakutsk, northern Mongolia, northern Manchooria, Sakhalin, Canada.

Sedum populifolium L. Fil. Supplem. p. 242; Ledeb. Fl. Alt. II, p. 189; Ledeb. Fl. Ross. II, p. 180; Крыл. Фл. Алт. II (1903) p. 457.

On moist, shady, mossy cliffs on the banks of the Bei-kem, in several places between Utinski porog and Buluk. In flower, and with partly ripe fruits. at the end of August.

Distribution: Southern Siberia (eastern part of the governments of Tomsk and Yeniseisk), northern Mongolia.

Sedum purpureum (L.) Link, Enum. Hort. Berol. I (1821) p. 437; Ledeb. Fl. Alt. II, p. 190; Ledeb. Fl. Ross. II, p. 181; Крыл. Фл. Алт. II (1903) p. 458. *Sedum Telephium* L. var. *purpureum* L., Maxim. *Crassulac.* Asiae Orient. p. 752. *Sedum Telephium* L. *β* Turczan. Fl. Baical.-Dahur. (1844) p. 246, no. 464.

Rather common in somewhat dry meadows, frequently in open larch-forest, etc., about the Sisti-kem, at Tshebertash, and Ust Sisti-kem.

Distribution: Europe (in Norway, Sundalsøren, Printz 1914, introduced?), Siberia, northwards to about 62° north lat. (the government of Tobolsk) and eastwards to Kamtchatka, northern Mongolia, Manchooria, northern China, Sakhalin, Japan.

Sedum Aizoon L. Spec. Pl. ed. II (1762) p. 617; Ledeb. Fl. Alt. II, p. 193; Turczan. Cat. Baical. no. 472; Ledeb. Fl. Ross. II, p. 183; Turczan. Fl. Baical.-Dahur. (1844) p. 245, no. 462; Maxim. *Crassulac.* Asiae Orient. p. 756; Крыл. Фл. Алт. II (1903) p. 459.

On the Sisti-kem, on dry slopes facing south and overgrown with copse wood, rather common, and in full bloom at the end of July. Form of leaves broadly lanceolate.

Distribution: Throughout Siberia, from the Ural and Altai to Kamtchatka, northern Mongolia (var.), eastern Asia (Manchooria, northern and central China, Corea), Sakhalin, Japan.

Sedum hybridum L. Spec. Pl. ed. II (1762) p. 617; Ledeb. Fl. Alt. II, p. 192; Turczan. Cat. Baical. no. 473; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 359; Ledeb. Fl. Ross. II, p. 183; Turczan. Fl. Baical.-Dahur. (1844) p. 245, no. 463; Maxim. *Crassulac.* Asiae Orient. p. 761; Крыл. Фл. Алт. II (1903) p. 460.

On the Abakan Steppe, between Askys and Ust Kamuishto, on dry, sloping cliffs, and near the Bei-kem, at Ust Sisti-kem. With young flowers in the second half of June, with flowers and fruit about the middle of August.

Distribution: The Ural, the Caucasus, Russian Turkestan, southern Siberia, eastwards to about Lake Baikal, northern Mongolia.

Cotyledon spinosa L. Spec. Pl. ed. II (1762) p. 615; Maxim. *Crassulac.* Asiae Orient. p. 725; Ledeb. Fl. Alt. II, p. 200; Turczan. Cat. Baical. no. 467; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 355. *Umbilicus spinosus* DC. Prodrom. III, p. 400; Ledeb. Fl. Ross. II, p. 174; Turczan. Fl. Baical.-Dahur. (1844) p. 241, no. 459; Крыл. Фл. Алт. II (1903) p. 452.

Young, globular to ovoid clusters of leaves, only from 2 to 3 cm. high, gathered by me on dry, sandy slopes on the Yenisei, between Minusinsk and Ust Abakansk, at the beginning of June. Besides, rather frequent at Ust Sisti-kem, in dry, sandy places, on sandy declivities towards the Bei-kem, etc., where collected in full flower in the middle of August.

Distribution: South-eastern Russia, Russian Turkestan, the Thian-Shan, the Altai, southern Siberia, eastwards to Manchooria, Mongolia, southwards to western Tibet and Gobi.

Saxifragaceae VENT.

Saxifraga androsacea L. Spec. Pl. ed. II (1762) p. 571; Ledeb. Fl. Ross. II, p. 225; Крыл. Фл. Алт. II (1903) p. 479; Engl. et Irmscher, *Saxifrag.* in Engl. Pflanzenr. H. 67 (1916) p. 302.

f. uniflora Wulf. in Fl. Nor. ed. Zool. Bot. Ges. Wien (1858) p. 464; Krylow, Pl. Altaicae Novae II, no. 13 in Act. Hort. Petropol. XXI (1902) p. 16; Engl. et Irmscher, l. c. p. 304.

The leaves are very small, entire, and, as the whole plant for the rest, slightly glandular hairy, especially so along the margin. The stems are from 3 to 3,5 cm. high, uniflorous, and furnished with generally 2 narrow, oblong, entire, slightly 3-nerved leaves, from 3 to 7 mm. long, and rounded at the top.

On moist cliffs in the Altaian, at an altitude of about 1900 m. above sea-level; with flowers at the end of July.

Distribution: Middle and southern Europe, the Altai and the Sayansk district.

Saxifraga oppositifolia L. Spec. Pl. ed. II (1762) p. 575; Bunge, Enum. Alt. p. 21; Turczan. Cat. Baical. no. 487; Ledeb. Fl. Ross. II, p. 204; Turczan. Fl. Baical.-Dahur. (1844) p. 259, no. 476; Крыл. Фл. Алт. II (1903) p. 471.

In the Altaian, above the limit of tree vegetation, on humid rocks; with flowers at the end of July.

Distribution: Arctic and alpine tracts of Europe, arctic islands, arctic and alpine regions of Siberia, northern Mongolia, Tibet, North America.

Saxifraga sibirica L. Spec. Pl. ed. II (1762) p. 577; Ledeb. Fl. Alt. II, p. 121; Turczan. Cat. Baical. no. 489; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 369; Ledeb. Fl. Ross. II, p. 219; Turczan. Fl. Baical.-Dahur. (1844) p. 263, no. 480; Крыл. Фл. Алт. II (1903) p. 477; Engl. et Irmscher, *Saxifrag.* in Engl. Pflanzenr. H. 67 (1916) p. 262.

var. **eusibirica** Engl. et Irmscher, l. c. p. 264.

The specimens collected have comparatively low stems, only about 6 cm. high. The basal leaves about 1 cm. in diameter, always 5-lobed, the bracts cordiform. Petals 1 cm. long, 2½ times as long as the sepals. Stems, pedicels and petioles pubescent, especially so on the upper parts, the blade generally more or less glabrous, f. *vestita* ENGL. et IRMSCHER.

Rather common in the Altaian, in humid places, at altitudes of about 2000 m. above sea-level; in full flower at the end of July.

Distribution: Eastern and south-eastern Europe, Caucasia and south-western Asia to Turkestan, the Himalayas, Tibet, Cashmere, through southern Siberia (the Altai, the Sayansk district, Baikal, Trans Baikal) to the Amoor Province and Manchooria, northern Mongolia.

Saxifraga punctata L. Spec. Pl. ed. II (1762) p. 574; Ledeb. Fl. Alt. II, p. 118; Ledeb. Fl. Ross. II, p. 215; Крыл. Фл. Алт. II (1903) p. 476; Engl. et Irmscher, *Saxifrag.* in Engl. Pflanzenr. H. 67 (1916) p. 9. *Saxifraga aestivalis* Fisch. et Meyer, Ind. Sem. Hort. Petro-

pol. I (1835) p. 37; Turczan. Cat. Baical. no. 498; Turczan. Fl. Baical.-Dahur. (1844) p. 269, no. 487.

var. **typica** Engl. et Irmscher, l. c. p. 10, *forma.*

The specimens collected of this widely distributed and much varying species have mostly rather broad and flat filaments, nearly liguliform, about one third shorter than the petals, with anthers of a brimstone colour. Petals obovate, of a white colour from 2 to 2,5 mm. long, 2 to 3 times as long as the sepals. The pedicels are 5 to 8 mm. long. Scape 15 to 20 cm. high, in the upper part markedly glandular hairy. The inflorescence 4 to 5 cm. long, ovoid, and with rather widely spreading branches, not unfrequently rectangularly. Number of capsules 2 or 3. Lowest bract from 0,5 to 0,7 cm. long, linear to lanceolate, the upper ones smaller, from 2 to 3 cm. long, and linear. Length of the petioles 3 to 4 times the diameter of the blade, the margins of which are comparatively coarsely indented, generally with from 20 to 25 teeth, measuring about 3 mm. in length and breadth, and the summit slightly pointed.

In the Altaian, at altitudes of about 2000 m. above sea-level, in moist, moss-clad, shady places, in full flower at the end of July.

Distribution: From eastern Russia, throughout Siberia, to eastern Asia, North America.

Saxifraga crassifolia L. Spec. Pl. ed. II (1762) p. 573; Ledeb. Fl. Alt. II, p. 117; Turczan. Cat. Baical. no. 492; Ledeb. Fl. Ross. II, p. 214; Turczan. Fl. Baical.-Dahur. (1844) p. 264, no. 481; Крыл. Фл. Алт. II (1903) p. 475. *Saxifraga cordifolia* Karel. et Kiril. Enum. Pl. Fl. Alt. no. 367.

Rather common about the Upper Amyl, in subalpine wooded regions on mountain slopes, etc. as well as in the Altaian, where ascending to altitudes of about 16—1700 m. above sea-level, often associated with *Betula rotundifolia, Trollius asiaticus,* etc. Gathered in full flower in second half of July. The specimens collected are completely glabrous, the leaves obovate, the margin crenate-dentate. The petals are of a light red, to 14 mm. long.

Distribution: Southern Siberia, from the southern part of the government of Tomsk to the southern part of the government of Yakutsk, the Yablonoi mountains, northern Mongolia.

Saxifraga melaleuca Fisch. Cat. Hort. Gorenk. ed. I (1808) p. 99; Ledeb. Fl. Alt. II, p. 119; Turczan. Cat. Baical. no. 497; Bunge, Enum. Alt. p. 20; Ledeb. Fl. Ross. II, p. 212; Turczan. Fl. Baical.-Dahur. (1844) p. 266, no. 484; Engl. et Irmscher, *Saxifrag.* in Engl. Pflanzenr. H. 67 (1916) p. 56; Крыл. Фл. Алт. II (1903) p. 473.

Rather common in the Altaian, at altitudes of about 2000 m. above sea-level, in moist places, among mosses and lichens. In full flower at the end of July. Height of scape varying from 6 to 20 cm., and number of flowers from 2 to 10, generally from 4 to 8.

Distribution: The Altai and Sayansk districts, northern Mongolia.

Saxifraga Hirculus L. Spec. Pl. ed. II (1762) p. 675; Ledeb. Fl. Alt. II, p. 121; Ledeb. Fl. Ross. II, p. 210; Turczan. Fl. Baical.-Dahur. (1844) p. 270, no. 488; Крыл. Фл. Алт. II (1903) p. 473; Engl. et Irmscher, *Saxifrag.* in Engl. Pflanzenr. H. 67 (1916) p. 110.

In the Altaian, near the limit of tree vegetation, in moist, moss-grown places. In full flower at the end of July.

Distribution: Arctic and alpine regions of Europe, arctic islands, Caucasia, Turkestan, arctic Siberia, the Altai and Sayansk districts, Trans Baikal, Tibet, the Himalayas, Cashmere, Mongolia, western China, North America.

Saxifraga stellaris L. Fl. Lapp. (1737) no. 175 et Spec. Pl. ed. II (1762) p. 572.

subspec. **comosa** Retzius, Fl. Scand. Prodrom. (1779); Ledeb. Fl. Ross. II, p. 211; Turczan. Fl. Baical.-Dahur. (1844) p. 268, no. 486; Engl. et Irmscher, *Saxifrag.* in Engl. Pflanzenr. H. 67 (1916) p. 81. *Saxifraga foliosa* R. Br., Turczan. Cat. Baical. no. 496.

This species is spread in the Altaian, in places grown with mosses and lichens, here and there accompanying *Phyllodoce coerulea*, and the like. All of the specimens collected have the stems comparatively low, from 5 to 10 cm. high. The basal leaves are from 0,8 to 1,5 cm. in length, cuneately tapering towards the base, the summit 5-toothed, with a large and broad median tooth, and 2 smaller and narrower ones on each side. The inflorescence is short and narrow, 1 to 2,5 cm., rarely to 3,5 cm. long, and generally consisting of from 3 to 7 shortly stalked or sessile gemmae, the leaves of which are ovate, sessile, from 1 to 2 mm. long, of a green colour. Generally one solitary flower is to be found at the top of the scape, mostly more or less incompletely developed, and sterile, or the top flower wanting altogether. The whole plant is beset with long, white, scattered hairs. The specimens collected thus seemed to be intermediate between the forms *eucomosa* and *minutipetala* Engl. et Irmscher, l. c. p. 83.

Distribution: The subspec. *comosa* is distributed over the arctic regions of Europe, arctic islands, arctic Siberia, the Sayansk mountains, North America, Greenland.

Saxifraga bronchialis L. Spec. Pl. ed. II (1762) p. 572; Ledeb. Fl. Alt. II, p. 124 in nota; Turczan. Cat. Baical. no. 500; Ledeb. Fl. Ross. II, p. 207; Turczan. Fl. Baical.-Dahur. (1844) p. 271, no. 490; Engl. Monogr. *Saxifrag.* (1872) p. 215.

In the Altaian, on the Upper Sisti-kem. Flowering at the end of July.

Distribution: Northern Russia, northern Siberia, the Altai and Sayansk districts, Trans Baikal, eastwards to Kamtchatka, North America.

Chrysosplenium nudicaule Bunge in Ledeb. Fl. Alt. II, p. 114; Bunge, Enum. Alt. p. 20; Ledeb. Fl. Ross. II, p. 226; Maxim. Diagn. Plant. Nov. Asiat. in Mel. Biol. IX (1877) p. 759; Franchet, Monogr. *Chrysosplenium* in Nouv. Arch. Mus. Hist. Natur. 3. Ser. (1890) no. 2; Крыл. Фл. Алт. II (1903) p. 480; Некрасова, Камнеломковыя въ Федченко, Фл. Азіат. Россіи 7 (1915) p. 13.

In moist, shady places in the Altaian, near the limit of tree vegetation. Nearly past flowering at the end of July.

Distribution: Russian Turkestan, the Thian-Shan, the Altai and Sayansk districts, northern Mongolia, Kamtchatka, northern China.

Chrysosplenium alternifolium L. Spec. Pl. ed. II (1762) p. 569; Ledeb. Fl. Alt. II, p. 115; Turczan. Cat. Baical. no. 502; Ledeb. Fl. Ross. II, p. 226; Turczan. Fl. Baical.-Dahur. (1844) p. 272, no. 491; Maxim. Diagn. Plant. Nov. Asiat. IX (1877) p. 760; Franchet, Monogr. *Chrysosplenium* (1890) p. 106; Крыл. Фл. Алт. II (1903) p. 480; Некрасова, Камнеломковыя въ Федченко, Фл. Азіат. Россіи 7 (1915) p. 22.

Scattered in moist, shady places in the taiga about the Upper Amyl, and near Ust Algiac. Past flowering in the second half of July.

Distribution: Europe, except the most southern portions, arctic islands, the Caucasus, arctic and wooded regions of Siberia, northern Mongolia, the Himalayas, Manchooria, northern China, Sakhalin, Japan, North America.

Parnassia palustris L. Spec. Pl. ed. II (1762) p. 391; Ledeb. Fl. Alt. I, p. 427; Turczan. Cat. Baical. no. 208; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 183; Ledeb. Fl. Ross. I, p. 262; Turczan. Fl. Baical.-Dahur. (1842) p. 310, no. 197; Regel, Pl. Radd. (1861) p. 504; Крыл. Фл. Алт. II (1903) p. 483.

In moist meadows and in thickets, scattered along the river Abakan and in the subalpine taiga territory about the river Amyl, at Kushabar and Kalna, rather common at Ust Algiac. In the Altaian found by me in moist, grass-grown places, to above the limit of tree vegetation. The species begins flowering in the middle of June.

Distribution: Europe, the Caucasus, south-western Asia to Turkestan, the Himalayas and Tibet, arctic and wooded regions of Siberia, northern Mongolia, northern China, northern Corea, Sakhalin, Japan, North America.

Ribes petraeum Wulf. in Jacq. Miscell. II, p. 36; Maxim. in Mel. Biol. IX, p. 230; Ledeb. Fl. Ross. II, p. 198; Hedlund in Bot. Not. 1901, p. 106; Крыл. Фл. Алт. II (1903) p. 465. *Ribes Biebersteinii* Berl., Hedlund in Bot. Not. 1901, p. 105. *Ribes atropurpureum* C. A. Meyer in Ledeb. Fl. Alt. I, p. 268. *Ribes triste* Bunge, Enum. Alt. p. 14; Turczan. Cat. Baical. no. 481; Turczan. Fl. Baical.-Dahur. (1844) p. 253, no. 470.

Scattered on the banks of the rivers Amyl and Bei-kem, near the Dora Steppe, and between Ust Sisti-kem and Buluk, especially in moist, moss-grown and shady places, and in humid chinks of rocks, near the river. With ripe fruits in the second half of August. Young twigs of this plant observed by me as used for pipe-stems by the natives, after the pith being removed.

Distribution: Middle Europe, Caucasia, south-western Asia, Siberia to the Amoor Province, Manchooria, northern Mongolia, the Himalayas, Sakhalin, Japan.

Ribes pubescens Hedlund, Bot. Not. (1901) p. 100; Крыл. Фл. Алт. II (1903) p. 464. *Ribes rubrum* L. Spec. Pl. ed. II (1762) p. 290 ex parte; Ledeb. Fl. Alt. I, p. 267; Turczan. Cat. Baical. no. 48; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 363; Ledeb. Fl. Ross. II, p. 199; Turczan. Fl. Baical.-Dahur. (1844) p. 252, no. 469; Maxim. Mel. Biol. IX, p. 233.

Common in the Uriankai district, especially along the rivers Sisti-kem and Bei-kem, mostly in thickets; with ripe fruits in August.

Distribution: Northern and middle Europe, the Caucasus, Turkestan, the western Himalayas, Siberia (in the government of Tobolsk to 67° north lat.), eastwards to Kamtchatka, northern Mongolia; eastern Asia, Sakhalin.

Ribes procumbens Pallas, Fl. Ross. II, p. 35; Bunge, Enum. Alt. p. 14; Turczan. Cat. Baical. no. 483; Ledeb. Fl. Ross. II, p. 198; Turczan. Fl. Baical.-Dahur. (1844) p. 255, no. 473. Maxim. Mel. Biol. IX, p. 117; Крыл. Фл. Алт. II (1903) p. 468.

On the banks of the Bei-kem, between Cha-kul and Ust Uss, especially in moist and boggy places, in thickets of foliferous trees. With quite ripe fruits at the beginning of September.

Distribution: Throughout southern Siberia, eastwards to Manchooria, northern Mongolia.

Ribes nigrum L. Spec. Pl. ed. II (1762) p. 291; Ledeb. Fl. Alt. I, p. 269; Turczan. Cat. Baical. no. 486; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 364; Ledeb. Fl. Ross. II, p. 200; Turczan. Fl. Baical.-Dahur. (1844) p. 254, no 471; Maxim. Mel. Biol. IX, p. 222; Крыл. Фл. Алт. II (1903) p. 468.

Common in the Urjankai district, along the rivers Sisti-kem and Bei-kem, especially in open brush-wood or on sunny hill-sides near the rivers. The fruits ripen here about the middle of August and are much appreciated by bears, occurring in rather great numbers in the said district.

Distribution: Europe, Siberia (in the Yenisei valley northwards to 68° north lat.), eastwards to Manchooria, Mongolia, China, western Asia, Turkestan. According to Hooker, occurring in the temperate parts of the Himalayas as well.

Rosaceae Juss.

Spiraea salicifolia L. Spec. Pl. ed. II (1762) p. 700; Turczan. Cat. Baical. no. 393; Turczan. Fl. Baical.-Dahur. (1843) p. 593, no. 384; Maxim. Adnotat. *Spiraeac.* (Act. Hort. Petropol. VI, 1879) p. 209; Ledeb. Fl. Ross. II, p. 15; Крыл. Фл. Алт. II (1903) p. 421.

Common in swampy grass-field, moist thicket, among mosses, and the like, on river-banks, etc., at Ust Sisti-kem, on the Kamsara and the Bei-kem, near the Dora Steppe. Held sacred by the natives of the Urjankai country.

In part done flowering about the middle of August.

Distribution: Northern and middle Europe (strayed), Siberia, to 64° north lat., northern Mongolia, eastern Asia, Sakhalin, Japan, North America (var.).

Spiraea trilobata L. Mant. II (1771) p. 244; Maxim. Adnotat. *Spiraeac.* p. 197; Ledeb. Fl. Alt. II, p. 214; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 286; Ledeb. Fl. Ross. II, p. 11; Крыл. Фл. Алт. II (1903) p. 420.

On dry, stony declivities, dry mountain sides, and the like, rather common in the tracts about the river Abakan. Taken with flowers in June.

Distribution: The Altai region, Turkestan, northern China.

Spiraea media Schmidt, Oesterr. Allg. Baumr. I (1792) p. 53; Maxim. Adnotat. *Spiraeac.* p. 187; Крыл. Фл. Алт. II (1903) p. 419. *Spiraea oblongifolia* W. et Kit. Pl. Rar. Hung. III (1812) p. 261; Ledeb. Fl. Ross. II, p. 13. *Spiraea hypericifolia β longifolia* Ledeb. Fl. Alt. II, p. 215. *Spiraea chamaedryfolia* (non. L.) Ledeb. Fl. Ross. II, p. 14.

Rather common on sunny cliffs on the mountain sides along the river Abakan, and between Karatus and Kushabar, near Ust Sisti-kem, and on the Kamsara. In some places there appear intermediates between the latter and the preceding one, probably of a hybrid nature. Flowering in June.

Distribution: South-eastern Europe, Turkestan, the Thian-Shan, Siberia, to 68½° north lat., northern Mongolia, eastern Asia, Sakhalin, north-western America.

Spiraea hypericifolia L. Spec. Pl. ed. II (1762) p. 701; Ledeb. Fl. Alt. II, p. 214; Turczan. Cat. Baical. no. 392; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 287; Turczan. Fl. Baical.-Dahur. (1843) p. 592, no. 381; Крыл. Фл. Алт. II (1903) p. 416.

f. *typica* Maxim. Adnotat. *Spiraeac.* p. 178. *Spiraea hypericifolia α genuina* et *β microphylla* Ledeb. Fl. Ross. II, p. 12; *γ brevifolia* Ledeb. Fl. Alt. II, p. 215.

The leaves in the specimens collected are comparatively narrow, to 4 mm. broad, and to 1½ cm. long, 1- or 3-nerved, entire, glabrous on both sides. Near Ust Abakansk on dry, stony hills. Nearly past flowering in the second half of June. Scattered in the Urjankai country, e. g. on dry hills between Ust Sisti-kem and the Kamsara.

Distribution: Middle and south-eastern Europe, Asia Minor, Persia, Siberia, northwards to about 60° north lat., northern Mongolia, Turkestan, central Asia.

Spiraea chamaedryfolia L. Spec. Pl. ed. II (1762) p. 701; Maxim. Adnotat. *Spiraeac.* p. 186; Ledeb. Fl. Alt. II, p. 213; Turczan. Fl. Baical.-Dahur. (1843) p. 590, no. 379; Крыл. Фл. Алт. II (1903) p. 418.

subspec. **ulmifolia** Maxim. l. c. *Spiraea ulmifolia* Scopoli, Fl. Carn. I, p. 379.

Near Kalna and at Ust Algiac, on hill-slopes facing south, in the subalpine region in the Altaian almost up to the tree limit. Past flowering in July.

By all accounts, some of the native tribes are said in preference to use wood of this plant for making the drum-sticks availed of by the shamans during their religious ceremonies.

Distribution: Austria, Siberia, to 69° north lat., northern Mongolia, Manchooria, Japan.

Spiraea alpina Pall. Fl. Ross. I, p. 35; Bunge, Enum. Alt. p. 29; Turczan. Cat. Baical. no. 390; Ledeb. Fl. Ross. I, p. 13; Turczan. Fl. Baical.-Dahur. (1843) p. 593, no. 383; Maxim. Adnotat. *Spiraeac.* p. 182; Крыл. Фл. Алт. II (1903) p. 418.

In the Altaian, near the tree limit, in grass-grown places, and in brush-wood. In flower at the end of July.

Distribution: Siberia, northern Mongolia.

Rosa acicularis Lindl. Rosarum Monogr. (1820) p. 44; Regel, Tent. Rosar. Monogr. (1877) p. 18; Крыл. Фл. Алт. II (1903) p. 413. *Rosa Gmelini* Bunge in Ledeb. Fl. Alt. II, p. 228; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 236; Ledeb. Fl. Ross. II, p. 75; Turczan. Fl. Baical.-Dahur. (1843) p. 638, no. 435. *Rosa alpina* var. Turczan. Cat. Baical. no. 44.

Very common on the islets in the rivers Abakan and Yenisei, where it begins flowering in the middle of June. The species was also found by me near Kushabar and scattered in the Urjankai country, for instance near Ust Kamsara and Ust Tara-kem.

Distribution: The species is distributed over northern and middle Europe, Siberia, to 70° north lat., northern Mongolia, Manchooria, Sakhalin, China, Japan. (The record from North America requires further authentication).

Rosa cinnamomea L. Spec. Pl. ed. II (1762) p. 703; Regel, Tentam. Rosar. Monogr. (1877) p. 39; Ledeb. Fl. Alt. II, p. 227; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 323; Ledeb. Fl. Ross. II, p. 76; Turczan. Fl. Baical.-Dahur. (1843) p. 637, no. 434; Крыл. Фл. Алт. II (1903) p. 413. *Rosa Dahurica* Pall. Fl. Ross. p. 61; Turczan. Cat. Baical. no. 443.

Rather common on the islets in the rivers Yenisei and Abakan, where I have collected it with buds and full-blown flowers in the second half of June.

Distribution: Northern and middle Europe, the Caucasus, western Asia, Siberia, northern Mongolia, eastern Asia, North America.

Rosa pimpinellifolia L. Spec. Pl. ed. II (1762) p. 703; Lindl. Rosarum Monogr. p. 50; Ledeb. Fl. Alt. II, p. 227; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 324; Ledeb. Fl. Ross. II, p. 73; Turczan. Fl. Baical.-Dahur. (1857) p. XXI, no. 1419; Regel, Tentam. Rosar. Monogr. p. 20; Крыл. Фл. Алт. II (1903) p. 411.

On dry hills, in thickets of foliferous trees between Karatus and Kushabar; in part past flowering about the middle of July. At Ust Kamsara with nearly ripe fruits in the middle of August.

Distribution: Europe, south-western Asia, southern Siberia, northern Mongolia, Manchooria.

Rubus Chamaemorus L. Spec. Pl. ed. II (1762) p. 708; Ledeb. Fl. Alt. II, p. 231; Turczan. Cat. Baical. no. 405; Ledeb. Fl. Ross. II, p. 71; Turczan. Fl. Baical.-Dahur. (1843) p. 603, no. 396; Крыл. Фл. Алт. II (1903) p. 410.

On *Sphagnum*-bogs near Kalna, between Ust Sisti-kem and Ust Kamsara, and in moist, moss-grown places in the forests between the Tara-kem and the Dora Steppe. Already past flowering in July.

Distribution: Northern Europe, Siberia, northern Mongolia, northern Manchooria, Sakhalin, Japan, North America, Greenland.

Rubus arcticus L. Spec. Pl. ed. II (1762) p. 708; Turczan. Cat. Baical. no. 404; Ledeb. Fl. Ross. II, p. 70; Turczan. Fl. Baical.-Dahur. (1843) p. 603, no. 395; Крыл. Фл. Алт. II (1903) p. 409.

The leaflets are generally completely sessile, the terminal leaflet also included; the petals are mostly rather small and short, in part quite orbicular. The stem is finely pubescent, zigzaggy, stiff and ligneous, of a reddish or yellowish colour, the petioles spreading, and with comparatively small stipules. During the flowering the sepals are ascending, appressed to the corolla, while, in Scandinavian specimens, they are recurved. (Comp. the records in Blytt, Norges Flora III (1876) p. 1174; Hartman, Handbok i Skand. Fl. (1879) p. 204; Neuman, Sveriges Fl. (1901) p. 397). On collecting this plant in the Sayansk district, I found the above character to be rather noticeable. It appears that also Turczaninow, l. c. has noticed the very same point. „Flores rosei, rarius albi. Calyces tempore florendi erecti, dein deflexi." In specimens of var. *grandiflorus* Ledeb. from Sakhalin, I have previously (H. Printz, Some Vascular Plants from Sakhalin, 1917), observed that the calyx during the flowering was not recurved either, but appressed to the corolla. This character thus seemed to be a strongly marked and pervading trait in the species in its eastern area. All of the specimens collected by me in the Sayansk tracts, however, belong to the typical form.

Occurring rather abundantly in humid, grass- and moss-grown places in the subalpine wooded tracts about the Upper Amyl, where taken by me in flower and with ripe fruits in the middle of July. The plant is also dispersed over the Urjankai country, where I have collected it at Ust Algiac and on the Upper Sisti-kem.

Distribution: Northern Europe, Siberia, northern Mongolia, Manchooria, Sakhalin (var. p. p.), North America (var. p. p.).

Rubus saxatilis L. Spec. Pl. ed. II (1762) p. 708; Ledeb. Fl. Alt. II, p. 231; Turczan. Cat. Baical. no. 403; Ledeb. Fl. Ross. II, p. 69; Turczan. Fl. Baical-Dahur. (1843) p. 602, no. 394; Крыл. Фл. Алт. II (1903) p. 408.

Pretty common in meadows and in thickets on the islets in the river Abakan, and in brush-wood on the banks, where I have collected it with young flowers in June. Also rather frequent in the Urjankai country, where taken by me near Ust Algiac, between Ust Sisti-kem and the Kamsara, near the Tara-kem, and on the Dora Steppe, at Utinski as well as in several places along the Bei-kem, where the fruits ripen at the end of July and in August. In the Altaian it ascends to above the tree limit.

Distribution: Europe, in the southern parts only on the mountains, Siberia, northwards to the Arctic Circle, northern Mongolia, central Asia, Manchooria, North America, Greenland.

Rubus idaeus L. Spec. Pl. ed. II (1762) p. 706; Ledeb. Fl. Alt. II, p. 230; Turczan. Cat. Baical. no. 402; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 294; Ledeb. Fl. Ross. II, p. 65; Turczan. Fl. Baical.-Dahur. (1843) p. 602, no. 393; Крыл. Фл. Алт. II (1903) p. 407.

Common on the islets in the rivers Yenisei and Abakan, where I have taken it with flowers in June; very common in the upper part of the Amyl valley, in open brushwood and similar places in the Urjankai country, at Ust Algiac, on the Upper Sisti-kem, at Ust Sisti-kem on the Kamsara, the rivers Tara-kem and Bei-kem. The fruits ripen in July.

Distribution: Europe, the Caucasus, Siberia, northwards to 68° north lat., northern Mongolia, eastern Asia (var.), North America (var.).

Rubus humulifolius C. A. Meyer, Fl. Prov. Wjatka p. 57; Крыл. Фл. Алт. II (1903) p. 409.

In humid thickets near Ust Kamsara, past flowering in August.

Distribution: Northern and eastern Russia, Siberia, in the Yenisey valley northwards to 69° 25′ north lat., northern Mongolia, the Amoor Province, Manchooria, northern Corea.

Agrimonia pilosa Ledeb. Ind. Sem. Hort. Dorpat. Suppl. (1823) p. 1; Ledeb. Fl. Alt. II, p. 205; Turczan. Cat. Baical. no. 438; Ledeb. Fl. Ross. II, p. 32; Turczan. Fl. Baical.-Dahur. (1843) p. 32, no. 429; Крыл. Фл. Алт. II (1903) p. 405.

var. **dahurica** Asch. et Graebn. Synops. VI, 1 (1902) p. 422. *Agrimonia dahurica α pilosa* Wallroth, Beitr. Bot. I, 1 (1844) p. 1842.

In thicket on the islets in the Yenisei and near Kushabar. With flowers in June and July. In the Urjankai country scattered in thickets, on rocky slopes, etc., at Ust Algiac, Ust Sisti-kem, on the Kamsara, and at Ust Tara-kem, where I have collected it with ripe fruits in the first half of August.

Distribution: Eastern portions of middle Europe, Finland, Siberia, northwards to 61° north lat., northern Mongolia, eastern Asia, Sakhalin, Japan, western Turkestan, Afghanistan, Cashmere.

Alchemilla pastoralis Buser, Not. Alchimil. Crit. Nouv. (1891) p. 18; Lindberg, Nord. *Alchemilla* (1909) p. 57.

Some specimens of this one occur in my collections from Kushabar, where collected in dry, grass-grown places; flowering in July.

Distribution: Throughout Europe, southern Siberia (Kushabar, in the Minusinsk district).

Alchemilla minor Hudson, Fl. Anglica ed. I (1762) p. 59; Lindberg, Nord. *Alchemilla* (1909) p. 91.

Some specimens of the latter are to be found in my collections from Kushabar, collected in dry, grass-grown places togcther with the preceding one. In full flower in the middle of July.

Distribution: Northern Europe, Greenland (according to Lindberg), and in southern Siberia (Kushabar, in the Minusinsk district).

Note. I have, besides, in my diary recorded forms of *Alchemilla vulgaris* L. (coll.) from Ust Algiac, Ust Sisti-kem, the Kamsara, and Ust Tara-kem. It seemed, accordingly, to be rather commen in the Urjankai country.

Sanguisorba officinalis L. Spec. Pl. ed. II (1762) p. 169; Turczan. Cat. Baical. no. 440; Ledeb. Fl. Ross. II, p. 27; Turczan. Fl. Baical.-Dahur. (1843) p. 635, no. 431; Крыл. Фл. Алт. II (1903) p. 401. *Sanguisorba carnea* Fisch. ex Link, Enum. Plant. Hort. Berol. I (1820) p. 144; Ledeb. Fl. Alt. I, p. 141; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 320.

Very common on the islets in the river Abakan, in somewhat moist meadows and in thickets, where the species begins flowering at the end of June. I have also collected the species between Karatus and Kushabar, near Ust Tara-kem, Ust Kamsara, and with ripe fruits about the middle of August, in meadows at Ust Sisti-kem, where it is of exceedingly common occurrence, together with *Gentiana detonsa*, *Spiraea salicifolia*, and others. The specimens vary considerably as to the shape of the leaflets and the length of their stalks. The leaflets are not always opposite, but sometimes alternate. Most of the specimens have very considerable auricles at the base af the leaflets (var. *auriculata* Focke in Hallier-Wohlfarth, Koch, Synops. (1891) p. 829).

Distribution: Europe, the Caucasus and south-western Asia to northern Persia, Siberia, northwards to past 71° north lat., northern Mongolia, eastern Asia, Japan, North America.

Filipendula ulmaria (L.) Maxim. Adnotat. *Spiraeac.* in Act. Hort. Petropol. VI (1879) p. 251; Крыл. Фл. Алт. II (1903) p. 399. *S. Ulmaria* L. Spec. Pl. ed. II (1762) p. 702; Ledeb. Fl. Alt. II, p. 217; Turczan. Cat. Baical. no. 396; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 289; Ledeb. Fl. Ross. II, p. 18; Turczan. Fl. Baical.-Dahur. (1843) p. 595, no. 387. *Ulmaria pentapetala* Gilib. Fl. Lithuan. V (1782) p. 236.

Very common in the territory explored, in humid places, in thickets, along brook-sides, and the like. All over the islets in the rivers Yenisei and Abakan, and also in moist places on the banks, where collected with young flower-buds in June. The species is also very common in the Urjankai country, where, on the mountains, ascending considerably higher than the limit of tree vegetation, the Algiac Pass, Ust Algiac, the Upper Sisti-kem, Ust Sisti-kem, the Kamsara, the Tara-kem, the Dora Steppe, etc. The species begins flowering here at the beginning of July. All of the specimens are more or less densely white felted on the under side of the leaves *(f. tomentosa* Ledeb. Fl. Alt. II, p. 217). At Ust Algiac I have, besides the above form, collected some specimens distinguished by having the leaves partly glabrous and green underneath. These specimens are also characteristic in having always the peduncles and pedicels completely glabrous as well.

The dried leaves of this plant are sometimes used by the Soyotes — the natives of the Urjankai country — for smoking, instead of tobacco.

Distribution: Europe, except the arctic regions, south-western Asia, Turkestan, Siberia, northwards to 68° north lat., northern Mongolia. Introduced into North America.

Filipendula hexapetala Gilib. Fl. Lithuan. V (1872) p. 237; Крыл. Фл. Алт. II (1903) p. 400. *Spiraea Filipendula* L. Spec. Pl. ed. II (1762) p. 702; Ledeb. Fl. Alt. II, p. 218; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 200; Ledeb. Fl. Ross. II, p. 16.

In dry meadows and open brush-wood, pretty common in the tracts about the rivers

Yenisei and Abakan, where it begins flowering at the end of June. The species is also common about Karatus and Kushabar.

Distribution: Europe, south-western Asia, southern Siberia.

Fragaria vesca L. Spec. Pl. ed. II (1762) p. 709; Ledeb. Fl. Alt. II, p. 232; Turczan. Cat. Baical. no. 406; Ledeb. Fl. Ross. II, p. 63; Turczan. Fl. Baical.-Dahur. (1843) p. 604, no. 397; Крыл. Фл. Алт. II (1903) p. 397.

Common between Minusinsk and Kushabar and in the Amyl valley, on dry, sunny hill-slopes, where I have found it with ripe fruits in the middle of July. Taken by me in the Urjankai country, near Ust Algiac, and near the mouth of the Kamsara.

Distribution: Europe, Siberia, to 63° north lat., northern Mongolia, the Caucasus, Asia Minor, the Thian-Shan, Afghanistan, North Africa, the Canaries, North and South America.

Fragaria viridis Duchesne, Nat. Hist. Fraisiers (1766) p. 135. *Fragaria collina* Ehrh. Beitr. zur Naturk. VII (1792) p. 26; Ledeb. Fl. Alt. II, p. 233; Turczan. Cat. Baical. no. 407; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 296; Ledeb. Fl. Ross. II, p. 64; Turczan. Fl. Baical.-Dahur. (1843) p. 605, no. 398; Крыл. Фл. Алт. II (1903) p. 398.

This species I have met with in the tracts about the Lower Abakan. Between Ust Abakansk and Minusinsk I have collected it with buds and fully opened flowers at the beginning of June. It grows here in thicket of *Caragana arborescens*, together with *Iris ruthenica, Solidago virgaurea, Aster alpinus, Stellaria graminea*, and others. Most of the specimens belong to f. *typica* Aschers. et Graebn. (Synops. VI (1903) p. 655), and have the stems to 15 cm. high, and the young leaves densely silver-hairy. The lateral leaflets are wholly sessile, while the terminal leaflet frequently has a stalk 2—3 mm. long. The shape of the leaflets is somewhat varying, ovate, or mostly oval, with a broad summit, nearly square cut. The whole plant is beset with long and rather dense hairs, frequently of a slightly yellowish colour.

Besides the typical form I have also collected specimens with 1 or 2 quite small pinnae on the petioles below the ordinary leaflets (f. *subpinnata* Celak. Prodr. Fl. Boehm. (1874) p. 634) and forms with much prolonged runners. (f. *flagellifera* Schur, Enum. Pl. Transs. (1866) p. 186). Near Uzuik, I have collected it at the end of June, with half ripe fruits and much prolonged calyx-lobes, to over 1 cm. long. These specimens are also distinguished by their extraordinary floweriness. The species also occurs scattered in the Urjankai country, where I have observed it at Ust Kamsara and near the Dora Steppe.

Distribution: Europe, the Canaries, south-western Asia to the Thian-Shan, Siberia, northwards to Krasnoyarsk, northern Mongolia.

Comarum palustre L. Spec. Pl. ed. II (1762) p. 718; Ledeb. Fl. Ross. II, p. 62; Крыл. Фл. Алт. II (1903) p. 395. *Potentilla palustris* Scopoli, Fl. Carniolica ed. II (1772) p. 359;

Ledeb. Fl. Alt. II, p. 250; Turczan. Fl. Baical.-Dahur. (1843) p. 627, no. 423. *Potentilla Comarum* Nestl., Turczan. Cat. Baical. no. 430.

Of rather common occurrence in the traversed regions of southern Siberia and the Urjankai country, in swampy meadows, on the borders of lakes and swamps, and on the banks of slow rivers. On the rivers Abakan and Yenisei, at Kushabar, Ust Algiac, Ust Sisti-kem, the Kamsara, the Tara-kem, and in the bogs on the Dora Steppe. In the specimens collected the petals are comparatively smaller and narrower than usual in Scandinavian ones; they are also broadest almost at the base and gradually tapering and prolonged into a point upwards. The downy stems are rather densely glandulous above.

Distribution: Northern and middle Europe, Caucasia, Trans Caucasia, Armenia, Siberia, northern Mongolia, Sakhalin, Japan, North America, Greenland.

Potentilla fruticosa L. Spec. Pl. ed. II (1762) p. 709; Wolf, Monogr. Gatt. *Potentilla* in Biblioth. Botanica H. 71 (1908) p. 55; Ledeb. Fl. Alt. II, p. 234; Turczan. Cat. Baical. no. 418; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 297; Ledeb. Fl. Ross. II, p. 61; Turczan. Fl. Baical.-Dahur. (1843) p. 625, no. 421; Крыл. Фл. Алт. II (1903) p. 370.

Very common along the banks of the river Amyl, on cliffs and in stony places which are sometimes inundated. Very common in the Urjankai country, for instance at Ust Algiac and Tshernoretska, in grass-grown places at Ust Tara-kem and on the Ulukem, near Bjelosarsk, where it usually does not attain a greater height than ½—1 m. The species flowers here in July. There seemed to occur all intermediates between var. *vulgaris* Willd. (Herb. ex Schlechtd. in Mag. Ges. Naturf. Fr. Berlin VII (1816) p. 285) and the following variety.

var. **tenuifolia** Lehm. Revis. *Potent.* (1856) p. 17; Wolf, l. c. p. 58.

Rather typically developed specimens have been collected by me on the river Abakan, near Uibat.

Distribution: The British Isles, southern Sweden, Russia, Siberia, northwards to 67° 25′ north lat., northern Mongolia, south-western and central Asia, eastern Asia, Sakhalin, Japan, North America.

Potentilla bifurca L. Spec. Pl. ed. II (1762) p. 711; Wolf, Monogr. Gatt. *Potentilla* p. 62; Ledeb. Fl. Alt. II, p. 245; Turczan. Cat. Baical. no. 419; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 303; Ledeb. Fl. Ross. II, p. 43; Turczan. Fl. Baical.-Dahur. (1843) p. 613, no. 408; Крыл. Фл. Алт. II (1903) p. 372.

This species is rather frequent in the tracts about the river Abakan, especially on the steppes, in dry meadows, on open, grass-grown and dry declivities, where I have collected it flowering and partly past flowering in June. In August with ripe fruits near Ust Sisti-kem, Ust Tara-kem, and at Bjelosarsk. The specimens collected exhibit several variations, which, however, may be grouped into the following 2 varieties:

var. **typica** Wolf, l. c. p. 64. *P. bifurca α major* Ledeb. Fl. Ross. II, p. 43.

This one is comparatively low, with ascending stems, and the whole plant is rather densely puberulent. The leaves are frequently 4- to 6-divided, and the leaflets, the shape of which is ovate-lanceolate, twice to four times as long as broad, to 20 mm. long, and 6—7 mm. broad, opposite or alternate, a character varying even in the very same plant. The leaflets are generally entire, more rarely 2-cleft at the summit, both of which shapes may sometimes be met with in the very same individual. Some specimens approaching *f. glabrata*, have the upper sides of the leaves completely glabrous, the veins beneath, and also the petioles and stems only sparingly pubescent. The floweriness is very varying, and the colour of the leaves changes between a deep green, with lighter under sides, and nearly bluish green.

var. **canescens** Ledeb. Fl. Ross. II, p. 44; Wolf, l. c. p. 65.

This variety, which is distinguished by being densely tomentose-canescent and by having leaves with rather numerous, small, broader, approximate pinnae and comparatively small flowers, I have found on dry declivities on the steppes between Minusinsk and Ust Abakansk. Flowering at the beginning of June.

Distribution: Eastern, central, and southern Russia, westwards to Roumania, Asia, except the extreme south.

Potentilla multifida L. Spec. Pl. ed. II (1762) p. 710; Wolf, Monogr. Gatt. *Potentilla* p. 154; Ledeb. Fl. Alt. II, p. 245; Turczan. Cat. Baical. no. 424; Ledeb. Fl. Ross. II, p. 42; Turczan. Fl. Baical.-Dahur. (1843) p. 619, no. 414.

var. **ornithopoda** (Tausch) Wolf, l. c. p. 156. *P. multifida β major* Ledeb. Fl. Ross. II, p. 43 p. p.; Крыл. Фл. Алт. II (1903) p. 376.

Common on the Abakan Steppe, on sunny, rocky slopes, in dry meadows, and the like, where the species begins flowering in the second half of June. In the Urjankai country I have found the species on the steppes about the Ulu-kem, from Bjelosarsk westwards towards Cha-kul, where the specimens were past flowering at the end of August.

var. **angustifolia** Lehm. Monogr. *Potentill.* (1820) p. 64; Wolf, l. c. p. 156. *P. multifida α minor* Ledeb. Fl. Ross. II, p. 43; Крыл. Фл. Алт. II (1903) p. 376. *P. tenella* Turczan., Karel. et Kiril. Enum. Pl. Fl. Alt. no. 302; Turczan. Fl. Baical.-Dahur. (1843) p. 620, no. 415.

Scattered on the steppes about the river Abakan, in dry grass-field, on dry rocks, and, as it seemed, sometimes in somewhat saliferous soil, for instance near Ust Kamuishto. In flower in the middle of June.

Distribution: In Europe in the western Alps, Lapland, Spitzbergen, northern Russia, temperate parts of Asia, in Siberia northwards to 66° north lat., North America?

Potentilla sericea L. Spec. Pl. ed. II (1762) p. 710; Wolf, Monogr. Gatt. *Potentilla* p. 161; Ledeb. Fl. Alt. II, p. 242; Turczan. Cat. Baical. no. 427; Ledeb. Fl. Ross. II, p. 41; Turczan. Fl. Baical.-Dahur. (1843) p. 621, no. 417; Крыл. Фл. Алт. II (1903) p. 374.

var. **genuina** Trautv. Enum. Pl. Song. (1860—68) no. 396; Wolf, l. c. p. 162; Ejusd. l. c.

The specimens collected are especially distinguished by having the leaves 5- to 8-pinnate, with very approximate pinnae. The upper pinnae are largest, and decrease in size down the rachis. The incisions of the pinnae nearly reach the vein; the segments are linear, very fine and narrow, 0,5—1 mm. broad, with distinctly recurved margins, and subobtuse summits. The leaves are densely white-pubescent on both sides. Of common occurrence on the dry Devonian sandstone cliffs on the Abakan Steppe. In full flower in the second half of June.

Distribution: Eastern Russia (Perm, Orenburg), Siberia to Trans Baikal, central Asia, the Caucasus, and Armenia?

Potentilla soongorica *Bunge* in Ledeb. Fl. Alt. II, p. 244; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 301; Ledeb. Fl. Ross. II, p. 42; Wolf, Monogr. Gatt. *Potentilla* p. 159. *P. multicaulis* Bunge in Mem. Acad. Sc. St. Petersb. II (1831) p. 99 p. p. *P. sericea β multicaulis* Lehm. Revis. *Potent.* p. 34.

Scattered on the steppes between Minusinsk and Ust Abakansk, where I have taken it in full flower at the beginning of June.

Besides the typical species, agreeing perfectly with Bunge's authentic specimens, I have collected, on the steppes on the Yenisei, near Ust Abakansk, some specimens differing in various respects, and which I enter as:

var. **glandulosa** *nov. var.* [Tab. VII, Fig. 3.]

Caudex crassus, validus, lignosus residuis foliorum vetustorum obtectus. Caules numerosi, tenues, graciles, subadscendentes, multiflori, pilis longis, albis, patentibus parce vestiti. Folia radicalia breviter petiolata, ambitu oblonge obovata, 3-4 juga. Foliola oblonge obovata fissa, laciniae aequilatae, 0,5-2 mm. - saepissime 1-1,5 mm. - latae, apice subobtusae et marginibus distincte revolutis, subtus albo-tomentosae, glandulis flavis, minutis, numerosis praeditae, supra virides, pilis sparsis vestitae. Stipulae suffuscae, membranaceae, lanceolatae, apice acuminatae in lacinias longas, filiformes fissae. Flores numerosi, 12-14 mm. diametro. Sepala dense tomentosa et glandulosa, externa quasi spatulata vel clavata, apice late rotundata, interna fere triangularia, acuminata, externis longiora. Petala flava obovata vel cordata, antice leviter emarginata. Stamina et carpella ut in specie typica.

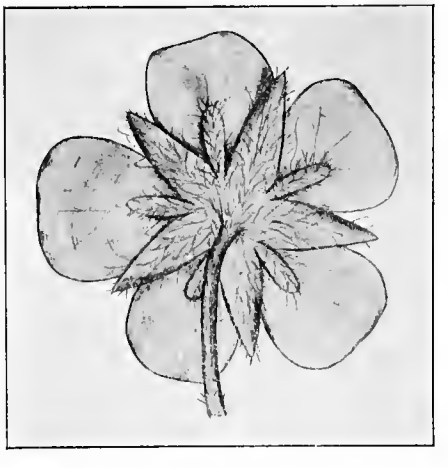

Fig. 94. *Potentilla soongorica* Bunge var. *glandulosa* nov. var. (4/1). Flower seen from below.

In the shape of the leaves this variety differs distinctly from the typical *P. soongorica*, especially so in the narrower, linear, rather approximate segments of the leaflets, moreover, in having the under sides of the leaves densely white-felted and with distinct-

ly revolute margins, the stems and the petioles are furnished with long, white, spreading hairs, several mm. long, which all of them are characters recalling, to a certain extent, *P. sericea*, and not to be found in BUNGE's authentic specimens of *P. soongorica*, which I had the opportunity to see in the Herbarium of the Imperial Botanical Gardens of Peter the Great in Petrograd. The specimens are remarkably flowery, and the diameter of the individual flowers, varying between 12 and 14 mm., also considerably exceeds that of the typical *P. soongorica* BUNGE. The outer sepals are broader, nearly clavate, not linear, as in the typical *P. soongorica*. A rather rich material of the latter variety has been collected by me on the steppes on the Yenisei, near Ust Abakansk, where in incipient flowering at the beginning of June.

Distribution: The species is distributed over Turkestan, Dzungaria, the Altai region, Mongolia, northern China.

Potentilla sibirica Wolf in Aschers. et Graebn. Synops. VI (1904) p. 698; Wolf, Monogr. Gatt. *Potentilla* p. 188. *P. pennsylvanica* Ledeb. Fl. Ross. II, p. 40; var. *genuina* Wolf, l. c. p. 189. *P. strigosa* Bunge in Ledeb. Fl. Alt. II, p. 237; Bunge, Enum. Alt. p. 30; Turczan. Fl. Baical.-Dahur. (1843) p. 617, no. 413. *P. pennsylvanica* var. *strigosa* Lehm. Monogr. *Potentill.* p.55; Крыл. Фл. Алт. II (1903) p. 380. *P. pennsylvanica* α Ledeb. Fl. Ross. II, p. 40.

The specimens collected always have the margins of the leaves much revolute. Rather common about the river Abakan, in open thickets of foliage trees, in the outskirts of forests of foliferous trees, etc. With some young flowers, but as yet chiefly with flowerbuds in the middle of June.

Near Ust Kamuishto I have collected some individuals of a rather vigorous form, the sepals of which are rather densely beset with yellow, glandular hairs. In the shape of the flower and the vegetative shoot for the rest, especially so in the leaves, distinctly felted underneath, with markedly revolute margins, the form agrees perfectly with *P. sibirica*, while the glandulous sepals and the markedly spreading, long, white hairs of the stem and the petioles, albeit scattered, are indicative of some connection with *P. tanacetifolia*. As the specimens are as yet so young, without fully opened flowers, I have not been able to examine the carpels. According to WOLF, l. c. p. 316, the bastard between the said species did not seem to be unfrequent in Siberia, and the above-mentioned specimens seemed to have to be referred to this combination.

Distribution: Eastern Russia, Siberia, to Trans Baikal, Turkestan, Mongolia.

Potentilla nivea L. Spec. Pl. ed. II (1762) p. 715; Wolf, Monogr. Gatt. *Potentilla* p. 233; Ledeb. Fl. Alt. II, p. 260; Turczan. Cat. Baical. no. 408; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 314; Ledeb. Fl. Ross. II, p. 57; Turczan. Fl. Baical.-Dahur. (1843) p. 606, no. 399; Крыл. Фл. Алт. II (1903) p. 389.

var. **elongata** Wolf, l. c.

In the Altaian, at an altitude of about 1900 m. above sea-level, in stony and grass-grown places. Flowering at the end of July.

var. **vulgaris** Schlecht. et Cham. (s. ampl.) in Linnaea II (1827) p. 21; Wolf, l. c. p. 236.

In the lowland near Minusinsk, in somewhat open places, in forest of larch, intermingled with divers foliage trees. The specimens collected belong to *f. major* Turczan. Fl. Baical.-Dahur. (1843) p. 606.

Distribution: The species is distributed over arctic Europe and in the mountain regions of middle Europe, Siberia, northwards to 71° 20′, Mongolia, central Asia, the Caucasus, North America, Greenland. The variety *elongata* occurs in middle Asia (Turkestan, Pamir, northern Mongolia); the variety *vulgaris* in the lower regions of Siberia.

Potentilla tanacetifolia Willd. Herb. ex Schlecht. Mag. Nat. Fr. Berlin, VII (1816) p. 286; Ledeb. Fl. Ross. II, p. 39; Wolf, Monogr. Gatt. *Potentilla* p. 314; Turczan. Fl. Baical.-Dahur. (1843) p. 615, no. 411; Крыл. Фл. Алт. II (1903) p. 378. *P. Filipendula* Turczan. Cat. Baical. no. 422.

In dry, grass-grown places in thicket of *Salix*, on an islet in the Yenisei, near Ust Abakansk. Some specimens of this one, as yet flowerless, have been collected by me at the beginning of June. It can, however, even in this phase of development, be distinguished from the following species, very nearly allied to it, and which, for the rest, it resembles much in external habitus.

Distribution: From the Altai region through southern Siberia to the western portions of the Amoor Province, Mongolia, northern Tibet.

Potentilla viscosa Don, Hortus Cantabrigiensis ed. II (1800) p. 68; Wolf, Monogr. Gatt. *Potentilla* p. 316; Ledeb. Fl. Alt. II, p. 238; Turczan. Cat. Baical. no. 421; Ledeb. Fl. Ross. II, p. 41; Turczan. Fl. Baical.-Dahur. (1843) p. 616, no. 412; Крыл. Фл. Алт. II (1903) p. 378.

Only a few specimens have been collected by me in dry, grass-grown meadows on islets in the river Abakan, near Ust Kamuishto. The specimens have stems 50 to 60 cm. high, with very scattered, short hairs, the leaves now and then nearly glabrous, but rather much glandulous. The leaflets are rather large, opposite, broad and ovate, 2 to 3 cm. long, 2 to 2,5 cm. broad, coarsely and irregularly indented at the margin, which is plane, not revolute. The petals, which are of a pale yellow — to judge from dried material — are somewhat shorter than the equally large and glutinous sepals, subacute at the summit. The whole plant is, for the rest, more or less glutinous. Collected flowering in the second half of June. I have also observed the species near Ust Sisti-kem, Ust Tara-kem, and at Bjelosarsk.

Distribution: Through Siberia, from the Ural to Manchooria, northern Corea, Mongolia, northern Tibet.

Potentilla supina L. Spec. Pl. ed. II (1762) p. 711; Wolf, Monogr. Gatt. *Potentilla* p. 389; Ledeb. Fl. Alt. II, p. 247; Turczan. Cat. Baical. no. 420; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 305; Ledeb. Fl. Ross. II, p. 35; Turczan. Fl. Baical.-Dahur. (1843) p. 614, no. 409; Крыл. Фл. Алт. II (1903) p. 394.

In grass-grown places near the river Uibat, on the banks near Ust Abakansk, with young flowers at the end of June, and also on the Ulu-kem, between Bjelosarsk and Chakul, with ripe fruits at the end of August.

Distribution: All over the hot and temperate regions of the northern hemisphere; in Europe, northwards to Denmark.

Potentilla norvegica L. Spec. Pl. ed. II (1762) p. 715; Wolf, Monogr. Gatt. *Potentilla* p. 401; Ledeb. Fl. Alt. II, p. 258; Turczan. Cat. Baical. no. 412; Ledeb. Fl. Ross. II, p. 36; Turczan. Fl. Baical.-Dahur. (1843) p. 610, no. 403; Крыл. Фл. Алт. II (1903) p. 394.

var. **genuina** Wolf, l. c.

Rather common in meadows near Kushabar, on the Amyl, and also in grass-grown places on the Sisti-kem, near Ust Algiac. Flowering in July.

Distribution: In the temperate and subarctic regions of the old and the new world. In Siberia, in the Yenisei valley, it ascends to about 62° north latitude.

Potentilla chrysantha Trevir. Ind. Sem. Hort. Wratislav. (1818) p. 5; Wolf, Monogr. Gatt. *Potentilla* p. 458; Ledeb. Fl. Alt. II, p. 253; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 309; Ledeb. Fl. Ross. II, p. 49; Крыл. Фл. Алт. II (1903) p. 383. *P. olopetala* Turczan. Cat. Baical. no. 415; Turczan. Fl. Baical.-Dahur. (1843) p. 612, no. 406.

var. **asiatica** Wolf, l. c. p. 462.

In rather dry meadows and thickets on the Abakan Steppe, near Askys. Flowering and past flowering in the middle of June. On the Lower Sisti-kem, and near Ust-Tara-kem, on grass-grown cliffs, near the river. Nearly past flowering in the middle of August.

Distribution: The species is distributed over south-eastern Europe, Siberia, northwards to about 68½° north latitude, and eastwards roughly to Trans Baikal, northern Mongolia, Turkestan. The variety *asiatica* is restricted to the Altai region, Turkestan, and western Mongolia.

Potentilla gelida C. A. Meyer, Ind. Pl. in Cauc. et ad Mare Casp. Collect. (1831) p. 167; Turczan. Cat. Baical. no. 410; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 313; Wolf, Monogr. Gatt. *Potentilla* p. 535; Ledeb. Fl. Ross. II, p. 59; Turczan. Fl. Baical.-Dahur. (1843) p. 608, no. 401; Крыл. Фл. Алт. II (1903) p. 387. *P. grandiflora* Bunge in Ledeb. Fl. Alt. II, p. 259 (non L.).

var. **genuina** Wolf, l. c. p. 536.

In the Altaian, in moist places grown with mosses and lichens, at an altitude of about 1900 m. above sea-level, near the perennial snow. In full flower at the end of July.

Distribution: Scandinavia, Russia, Siberia to Trans Baikal, northern Mongolia, south-western and central Asia to Cashmere and western Tibet.

Potentilla opaciformis Wolf in Aschers. et Graebn. Synops. VI (1904) p. 802; Wolf, Monogr. Gatt. *Potentilla* p. 573. *P. opaca* Ledeb. Fl. Alt. II, p. 255; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 311; Ledeb. Fl. Ross. II, p. 49. *P. rubens* Zimmet., Крыл. Фл. Алт. II (1903) p. 386.

Near Ust Abakansk, in dry, grass-grown places, and on cliffs near Uibat. Nearly past flowering in the middle of June.

Distribution: Southern and eastern Russia, south-western Asia, Siberia, except the eastern portions.

Potentilla subacaulis L. Syst. Nat. ed. X (1758) p. 1065 et Spec. Pl. ed. II (1763) p. 715; Wolf, Monogr. Gatt. *Potentilla* p. 632; Ledeb. Fl. Alt. II, p. 261; Turczan. Cat. Baical. no. 413; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 315; Turczan. Fl. Baical.-Dahur. (1843) p. 610, no. 404. *P. cinerea β trifoliata* Ledeb. Fl. Ross. II, p. 54 ex parte.

Scattered on dry cliffs, dry hills, etc., on the steppes between Minusinsk and Ust Abakansk. The specimens collected, taken at the beginning of June, are, for a great part, already past flowering. I have also found the species in the Urjankai country, at Ust Sistikem, the Kamsara, Ust Tara-kem, and in several places on the steppes about the Ulukem, between Bjelosarsk and Cha-kul.

Distribution: Throughout southern Siberia, from the government of Tomsk to the eastern parts of the Amoor Province, northern Mongolia, north-eastern Tibet, eastwards to Manchooria.

Potentilla fragarioides L. Spec. Pl. ed. II (1762) p. 710; Wolf, Monogr. Gatt. *Potentilla* p. 635; Ledeb. Fl. Alt. II, p. 248; Turczan. Cat. Baical. no. 429; Ledeb. Fl. Ross. II, p. 38; Turczan. Fl. Baical.-Dahur. (1843) p. 615, no. 410; Крыл. Фл. Алт. II (1903) p. 376.

var. **typica** Maxim. Mel. Biol. IX, p. 158; Wolf, l. c. p. 637.

Rather common in meadows and in thickets on the islets in the Yenisei, near Ust Abakansk, where taken by me in full flower at the beginning of June. It was also found by me near Kushabar, and in the Urjankai country, at Ust Tara-kem.

The specimens collected have rather low and tender stems, about 10 cm. high, and are always destitute of runners. The flowers are small, 9—14 mm. in diameter. The petals, only slightly exceeding the calyx in length, differ from Wolf's description in having generally the margin distinctly emarginate. Komarow, in his Фл. Маньчжуріи II, 2, p. 494, however, reports in this variety «petala integra vel leviter emarginata». Otherwise, the specimens collected agree rather perfectly with Wolf's description. Some specimens are considerably coarser, however, with rather vigorous stems, about 15 cm. high, and larger flowers, reaching up to 16—18 mm. in diameter, and with cordiform petals more indented at the margin, their breadth in all cases exceeding their length. These villous forms, with long, white, spreading hairs, recall, in some respects, the specimens of var. *Sprengeliana* Maxim. which I have seen from Sakhalin, figured in Printz, Vasc. Pl. Sakhalin (1916) p. 13, tab. II, and form distinct transitions to these. The last-mentioned variety, the most typical representatives of which are to be found in eastern Asia (Sakhalin and Japan), and where it is especially common, grows, according to Krylow, westwards to Omsk. Thus, the above varieties seemed, for the rest, to pass quite imperceptibly into each other.

Distribution: Throughout southern Siberia, temperate and subarctic regions of eastern Asia.

Potentilla ternata (Maxim.) Freyn in Oesterr. Bot. Zeitschr. (1902) p. 62 (sep. p. 29). *P. fragariodes L.* var. *ternata* Maxim. Mel. Biol. IX, p. 159. *P. Freyniana* Bornmüller, Wolf, Monogr. Gatt. *Potentilla* p. 639, *forma* [Tab. VIII].

The specimens found by me, are distinguished by their high, vigorous, furrowed, reddish-brown stems, to 30 cm. high, furnished with long, scattered, spreading, partly somewhat curved, white hairs, whereby much recalling *Potentilla fragarioides* var. *typica,* the hairs of which, however, are by far denser.

The specimens are exceedingly flowery; the pedicels are long, from 3 to 5 cm., fine and slender, and are distinguished by being relaxed and curved, whereby the flowers, at any rate after falling out, become drooping. In some of the pedicels are to be found small, entire, toothed or divided bracteoles. Stolons are wanting, at any rate in the specimens collected. The outer lanceolate sepals are only slightly shorter than the inner ones, which are more triangular, and acute. The petals are somewhat longer than the calyx, ovate, subobtuse, not indented at the summit. In the diameter of the flowers, being from 12 to 14 mm., the specimens somewhat exceed the typical species, and approach, to some extent, var. *grandiflora* Wolf, l. c., known only from Japan, from which, however, they also differ by their great floweriness. The basal leaves are comparatively long-petioled, as a rule digitately tri-foliolate. Some of the leaves, however, are characteristic in possessing a lower pair of leaflets farther down the petiole, whereby the leaf becomes distinctly pinnate. The lower pair is generally placed some way down the petiole, whereby the distance between the 2 pairs of pinnae is generally comparatively great (Tab. VIII). Leaves with more than 2 pairs of pinnae have never been observed by me, and the second pair of pinnae are frequently reduced to mere scales, if anything, which is most usual, and from where there is every transition to specimens in which the said lower pair of leaflets are large and well developed. Their shape is, for the rest, much the same as that of the upper pair of leaflets, and, like this one, with rather coarse, acute teeth at the margin. From specimens in which all of the basal leaves are 3-foliolate, there is to be found every transition to forms where at least a great part of the basal leaves are pinnatifid. Thus, from the typical *P. ternata* there are, chiefly on account of the shape of the leaves, and for the rest, also in consequence of the pubescence, distinct transitions to forms most properly to be referred to *P. fragarioides.*

Similar specimens, in which some of the basal leaves are furnished with a rudimentary pinna about the middle of their petioles, have previously been found by Makino at Yokogura yama, on the isle of Shikoku (Japan). Wolf, when mentioning these, indicates that they may be bastards between *P. ternata* and the eastern variety *Sprengeliana* of *P. fragarioides* The carpels in the specimens collected by me, seemed, however, to be well developed; they are small, somewhat more than 1 mm. long, anything like bean-shaped, narrower at one end, yellowish white, slightly rugose on the surface, and a little longer

than the style. These well-developed carpels, however, cannot be taken for absolute proofs against a hybrid nature, for there are instances that authentic bastards of *Potentilla* may give well-developed carpels. In my opinion, such specimens as those described may as well be explained as an evidence of the near relationship of *Potentilla ternata* to *P. fragarioides* — as intermediates between them — and it would therefore possibly be as right to enter our plant under MAXIMOWICZ's name as *Potentilla fragarioides* var. *ternata*.

Occurring in thickets and meadows on the islets in the Yenisei, between Minusinsk and Ust Abakansk, where the specimens are mostly past flowering at the beginning of June.

Distribution: *Potentilla ternata* is previously known in the Amoor Province, eastern Manchooria, the Ussuri Province, Japan.

Potentilla flagellaris Willd. Herb. ex Schlecht. Mag. Ges. Naturf. Fr. Berlin, VII (1816) p. 291; Wolf, Monogr. Gatt. *Potentilla* p. 662; Turczan. Cat. Baical. no. 414; Ledeb. Fl. Ross. II, p. 52; Turczan. Fl. Baical.-Dahur. (1843) p. 611, no. 405; Крыл. Фл. Алт. II (1903) p. 392. *P. nemoralis* Bunge in Ledeb. Fl. Alt. II, p. 256 (excl. syn.).

Pretty common in moist meadows in brush-wood, and the like, on an islet in the river Abakan, near Ust Kamuishto, where I have collected it in flower and partly past flowering at the end of June. It also occurs in the Urjankai country, in humid grass-fields on the banks of the Ulu-kem, at Bjelosarsk, and near Cha-kul.

Distribution: Temperate portions of Siberia, northern Mongolia, Manchooria, northern Corea, northern China.

Potentilla argentea L. Spec. Pl. ed. II (1762) p. 712; Wolf, Monogr. Gatt. *Potentilla* p. 256; Ledeb. Fl. Alt. II, p. 252; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 307; Ledeb. Fl. Ross. II, p. 47; Крыл. Фл. Алт. II (1903) p. 385.

Scattered about Kushabar where found be me on dry hills with flowers at the middle of July.

Distribution: Europe, Caucasia and south-western Asia, Siberia, eastwards to about Lake Baikal, northern Mongolia, North America (introduced).

Potentilla anserina L. Spec. Pl. ed. II (1762) p. 710; Wolf, Monogr. Gatt. *Potentilla* p. 669; Ledeb. Fl. Alt. II, p. 249; Turzan. Cat. Baical. no. 428; Ledeb. Fl. Ross. II, p. 44; Turczan. Fl. Baical.-Dahur. (1843) p. 623, no. 418; Крыл. Фл. Алт. II (1903) p. 393.

Very common in the territory explored, where occurring under a great many different forms. In the Minusinsk district it is very common along banks of rivers, etc., and on saliferous soil at Ust Kamuishto. Among the material collected the following forms may be separated: *vulgaris, sericea, incisa, discolor,* and *tenella.* In the Altaian, near the tree limit, I have found specimens of a form much recalling *f. grandis.* Collected in full bloom from June to August.

Distribution: Europe, except the extreme south, Caucasia and south-western Asia, Siberia, northwards to 68½° north latitude and eastwards to Kamtchatka and the Amoor Province, Manchooria, northern China, Mongolia, Tibet, the Himalayas, Japan, Sakhalin, North and South America, Greenland, Australia.

Sibbaldia procumbens L. Spec. Pl. ed. II (1762) p. 307; Ledeb. Fl. Alt. I, p. 428; Turczan. Cat. Baical. no. 433; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 317; Ledeb. Fl. Ross. II, p. 32; Turczan. Fl. Baical.-Dahur. (1843) p. 627, no. 424; Крыл. Фл. Алт. II(1903) p. 363.

Pretty common in the Altaian, in dry, gravelly places, etc., where I have met with it in subalpine wooded tracts (at an altitude of 900 m. above sea-level, on the Upper Sisti-kem), together with *Betula rotundifolia*, and right up to the perennial snow. Specimens taken in subalpine tracts, bearing nearly ripe fruits at the end of July. These last-mentioned ones are distinguished by a more luxuriant growth, and generally have comparatively long peduncles, overtopping, or, at any rate, equalling the leaves. Ascherson et Graebner, Synops. VI, I (1904) p. 662, record the range of this species only to comprise Europe, referring the Asiatic one to a nearly allied species *S. parviflora* Willd. Neue Schr. Naturf. Fr. Berlin, II (1799) p. 125. My material from northern Mongolia agrees perfectly, at any rate, even in detail, with specimens of the typical *S. procumbens* from Scandinavia, and can be separated in on respects from these. In Fl. Ross. II, p. 32, Ledebour also refers *S. parviflora* as a synonym under *S. procumbens*, and this species is also entered by Turczaninow in Fl. Baical.-Dahur., the classical work on eastern Siberia. The specimens taken by me in more elevated localities, are, in comparison with the above-mentioned material from subalpine tracts, as might have been expected, on the whole less luxuriant, more densely tufted, with smaller and more shortly petioled leaves, shorter peduncles, and sometimes with smaller flowers, which, however, at the highest, only entitles to enter these somewhat reduced specimens as a habitat modification. By minute dissections and comparisons I have found that the variations of my Mongolian specimens at large are within the limits of the Scandinavian material, and that the typical *Sibbaldia procumbens* therefore, no doubt, also occurs in Asia.

Distribution: Arctic and alpine tracts of Europe, arctic Siberia, the Altai and Sayansk regions, northern Mongolia, Russian Turkestan, the Himalayas, Tibet, North America.

Sibbaldia adpressa Bunge in Ledeb. Fl. Alt. I, p. 428; Bunge, Enum. Alt. p. 17; Turczan. Cat. Baical. no. 434; Ledeb. Fl. Ross. II, p. 33; Turczan. Fl. Baical.-Dahur. (1843) p. 628, no. 425; Крыл. Фл. Алт. II (1903) p. 364.

On dry cliffs on the Abakan Steppe. Nearly past flowering in the middle of June.

Distribution: Southern Siberia (the eastern Altai, estwards to Trans Baikal), Mongolia.

Chamaerhodos erecta Bunge in Ledeb. Fl. Alt. I, p. 430; Turczan. Cat. Baical. no. 437; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 316; Ledeb. Fl. Ross. II, p. 33; Turczan. Fl. Baical.-Dahur. (1843) p. 630, no. 427; Крыл. Фл. Алт. II (1903) p. 360.

On dry, sandy hills in open pine-wood, near the salt lake Tagarski osero at Minusinsk, where of rather common occurrence, and also on the Abakan Steppe, near Ust Abakansk.

In my material from those regions there occur specimens with one solitary, high, erect stem, *α stricta* Ledeb. l. c., and specimens with several shorter, decumbent and ascending stems, *β adscendens* Ledeb. l. c. In full flower in the first half of July. In the Urjankai country I have found the species scattered on dry steppes on the river Bei-kem at Ust Kamsara, Ust Tara-kem and on the Ulu-kem, between Ust Tapsa and Cha-kul, where it was past flowering, bearing fruits at the end of August and the beginning of September.

Distribution: Eastern Russia, southern Siberia, from the Ural to the Amoor Province, northern Mongolia, northern China.

Geum rivale L. Spec. Pl. ed. II (1762) p. 717; Ledeb. Fl. Alt. II, p. 265; Ledeb. Fl. Ross. II, p. 23; Крыл. Фл. Алт. II (1903) p. 359.

In slightly moist, grass-grown places, in thickets on the banks of the rivers Yenisei and Abakan, where I have collected it with ripe fruits in June. Scattered in the Amyl taiga, and in meadows, near Ust Sisti-kem. It did not seem to be of very frequent occurrence.

Distribution: Europe, except the extreme south-eastern portions, south-western Asia, Russian Turkestan, Siberia, northwards to 62° north latitude, and eastwards to the provice of Yeniseisk.

Geum Aleppicum Jacquin, Icon. Plant. Rar. I (1781—86) t. 95 et Collect. Botan. I, p. 88. *G. strictum* Aiton, Hort. Kewensis ed. II, 2 (1811) p. 217; Turczan. Cat. Baical. no. 400; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 292; Ledeb. Fl. Ross. II, p. 22; Turczan. Fl. Baical.-Dahur. (1843) p. 599, no. 391; Крыл. Фл. Алт. II (1903) p. 357. *G. intermedium* Ledeb. Fl. Alt. II, p. 265.

Very common on the islets in the river Abakan, and on the banks of the river, in moist and shady thickets of *Salix* and *Populus laurifolia*, where I have collected it with young flowers at the end of July. Also occurring near Kushabar, and rather common in the Urjankai country, about Ust Algiac, Ust Sisti-kem, and on the Bei-kem, near Ust Kamsara, the Tara-kem, and the Dora Steppe.

Distribution: Eastern part of middle and southern Europe, south-western Asia, Siberia, northwards to about 65° north latitude, Russian Turkestan, northern Mongolia, eastern Asia, Sakhalin, North America.

Coluria geoides R. Br. Flor. Insulae Melville p. 392 (Vermisch. Botan. Schrift. I, 1825); Ledeb. Fl. Alt. II, p. 263; Ledeb. Fl. Ross. II, p. 21; Крыл. Фл. Алт. II (1903) p. 356.

On the Abakan Steppe near Ust Abakan, on slopes, nearly past flowering at the beginning of June, on the Lower Sisti-kem, on the Tapsa and near Bjelosarsk.

Distribution: Siberia (the most southern portions of the governments of Tomsk and Yeniseisk), northern Mongolia.

Dryas octopetala L. Spec. Pl. ed. II (1762) p. 717; Ledeb. Fl. Alt. II, p. 267; Turczan. Cat. Baical. no. 399; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 291; Ledeb. Fl. Ross. II, p. 20; Turczan. Fl. Baical.-Dahur. (1843) p. 598, no. 390; Крыл. Фл. Алт. II (1903) p. 355.

Common in the Altaian, in places grown with lichens and mosses, where I have collected it with ripe fruits at the end of July. All of the specimens collected here are characteristic in having the glandular hairs on the calyx and on the upper parts of the scape yellow or copper-coloured, never black, as is the case with the Scandinavian specimens with which I have compared them. In all of the North-european authors mentioning the colour of this glandular hairs, they are recorded to be black (Blytt, Hartman, Neuman), a character which must thus be considered to be distinctive and invariable. The glandular hairs to be found right up to the summits of the sepals therefore give those occurring in my material a lighter yellow or brownish colour, not black as in the Scandinavian specimens. They also differ somewhat in shape, tapering gradually upwards from a broader base, while the Scandinavian ones are more equally broad throughout their length, only tapering towards the summit. The fruits when ripe, are of a deep green, like the prolonged styles. Besides, there is a difference which seemed to prevail, being also mentioned already by Turczaninow, l. c., viz. that the veins on the under sides of the leaves are always glabrous, not pubescent, whereby appearing much more distinctly than in the Scandinavian specimens, where the veins are generally lanate so at to merge into the white-canescent under side of the leaf.

Distribution: Arctic islands, arctic and alpine regions of Europe, the Caucasus, arctic Siberia, and on the high mountains to the south, northern Mongolia, North America, Greenland.

Crataegus sanguinea Pall. Fl. Ross. I, p. 25; Ledeb. Fl. Alt. II, p. 221; Turczan. Cat. Baical. no. 445; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 327, 328; Ledeb. Fl. Ross. II, p. 88; Turczan. Fl. Baical.-Dahur. (1843) p. 639, no. 436; Крыл. Фл. Алт. II (1903) p. 424.

Common on islets in the rivers Yenisei and Abakan, where the shrubs attain a height of 2—3 m. Flowering at the beginning of June. The thorns to 3,5 cm. long, the leaves deeply indented; the specimens collected accordingly belong to *f. incisa* Regel (Act. Hort. Petropol. I (1871) p. 116. Also to be found scattered about Kushabar.

Distribution: Eastern Russia, Siberia, northwards to 61° north latitude, Mongolia, Turkestan, eastern Asia, Sakhalin.

Cotoneaster melanocarpa (L.) Loddiges, The Botan. Cabinet XVI (1828) t. 1531; *Cotoneaster vulgaris β melanocarpa* Ledeb. Fl. Alt. II, p. 219; Turczan. Cat. Baical. no. 446; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 329; Ledeb. Fl. Ross. II, p. 89; Turczan. Fl. Baical.-Dahur. (1843) p. 641, no. 437; Крыл. Фл. Алт. II (1903) p. 425.

Common in the tracts about the rivers Yenisei and Abakan, frequently on sunny hills, here and there accompanying *Caragana arborescens*. The species begins flowering at the beginning of June. In the Urjankai country I have found it between Tshebertash

and Ust Sisti-kem, on red Devonian sandstone, near the Kamsara, and on the Tara-kem, with ripe fruits in August.

Distribution: Northern and middle Europe, Siberia, northwards to about 66° north latitude, northern Mongolia, south-western and central Asia.

Sorbus aucuparia L. Spec. Pl. ed. II (1762) p. 683; Крыл. Фл. Алт. II (1903) p. 427. *Pyrus aucuparia* (L.) Gaertn. De Fruct. et Sem. Plant. II (1791) p. 87; Ledeb. Fl. Alt. II, p. 223; Turczan. Cat. Baical. no. 450; Ledeb. Fl. Ross. II, p. 100; Turczan. Fl. Baical.-Dahur. (1843) p. 644, no. 441.

Pretty common in the taiga territory of southern Siberia and the Urjankai country. In subalpine wooded tracts between Kushabar and Ust Algiac, scattered on the rivers Sisti-kem and Kamsara, near the Tara-kem, and in several places on the Bei-kem, between the Dora Steppe and the Sebi, and also in the wooded region north of Kemchik to Minusinsk. Ripe fruits in September. When ripe the berries are eaten fresh, and are much appreciated by the natives.

Distribution: Europe, the Caucasus, Siberia, northwards to towards 70° north latitude, northern Mongolia, Turkestan, the Thian-Shan, central Asia, Sakhalin, Japan (var.), North America (introduced).

Prunus Padus L. Spec. Pl. ed. II (1762) p. 677; Ledeb. Fl. Alt. II, p. 212; Ledeb. Fl. Ross. II, p. 8; Turczan. Fl. Baical.-Dahur. (1843) p. 588, no. 377; Крыл. Фл. Алт. II (1903) p. 352. *Cerasus Padus* Turczan. Cat. Baical. no. 387.

Of very common occurrence on the islets and along the banks of the rivers Yenisei and Abakan, where flowering in the second half of May and the first half of June. The petals frequently appear to be remarkably deep and argute serrulate at the margin. The last year's branches are generally glabrous; at this time, however, may be found, here and there, smaller hairy parts. The leaves are glabrous beneath, only in the angles between the veins with a tuft of rust-coloured or white hairs. Thus, the specimens agree perfectly with the European form. The branches of the trees are not unfrequently somewhat pendent *f. pendula* Dippel (Handb. Laubholzk. I (1906) p. 640). In the Urjankai country the species is also of very common occurrence on the banks of the rivers Sisti-kem, Tara-kem, Kamsara, Bei-kem, and Ulu-kem. The fruits ripen in August.

Distribution: Northern and middle Europe, the Caucasus, Siberia, Mongolia, Russian Turkestan, the Himalayas, eastern Asia.

Leguminosae Juss.

Thermopsis lanceolata R. Br. in Aiton, Hort. Kewensis ed. II (1811) p. 3; Ledeb. Fl. Alt. II, p. 112; Turczan. Cat. Baical. no. 293; Ledeb. Fl. Ross. I, p. 510; Turczan. Fl. Baical.-Dahur. (1842) p. 717, no. 282; Крыл. Фл. Алт. II (1903) p. 213. *Sophora lupinoides* Pallas, Spec. *Astrag.* (1800—1802) p. 119.

Very common on sandy steppes between Minusinsk and Ust Abakansk, and also here and there on rocks on the Abakan Steppe. The species begins flowering here at the beginning of June. Also observed past flowering on dry southern slopes, near Ust Kamsara, and on the steppes about the Ulu-kem at the end of August. The plants nearly always beset with one or several specimens of the Spanish fly (*Lytta caraganae* PALL.).

Distribution: South-eastern Russia, Russian Turkestan, southern Siberia to Trans Baikal, northern Mongolia, northern China.

Medicago platycarpa (L.) Ledeb. Fl. Ross. I, p. 523; Крыл. Фл. Алт. II (1903) p. 216. *Trigonella platycarpos* L. Spec. Pl. ed. II (1763) p. 1093; Ledeb. Fl. Alt. III, p. 252; Turczan. Cat. Baical. no. 297; Turczan. Fl. Baical.-Dahur. (1842) p. 721, no. 286.

By the road between Kushabar and Karatus, near the banks of the river Amyl, in the transition zone between the steppes and the wooded region. Collected in slightly moist, grass-grown thicket, with flowers and young fruits in the middle of July. Taken with ripe fruits near Ust Sisti-kem and on wood-steppes at Ust Tara-kem in the middle of August.

Distribution: Southern Siberia, eastwards to the government of Irkutsk, Russian Turkestan, northern Mongolia.

Medicago falcata L. Spec. Pl. ed. II (1763) p. 1096; Ledeb. Fl. Alt. III, p. 250; Turczan. Cat. Baical. no. 294; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 204; Ledeb. Fl. Ross. I, p. 524; Turczan. Fl. Baical.-Dahur. (1842) p. 719, no. 284; Крыл. Фл. Алт. II (1903) p. 217.

The material collected shows considerable variations as to shape and size of the leaflets, pubescence of the plants, floweriness, etc. The shape of the leaflets varies from nearly ovate to very oblong, about 6 times as long as broad. The subulate, mucronulate stipules are partly entire, partly serrulate at the margin. The raceme rather flowery, generally containing 8—14 flowers. Length of the fully developed flowers 10—12 mm. Of very common occurrence on the Abakan Steppe and on the islets in the lower part of the river, in open, sunny places, on stony declivities, in dry, sandy and stony grass-field, etc., where I have collected it with young flowers and flower-buds in the first half of June. It is also scattered on the road between Karatus and Kushabar, at Ust Sisti-kem, and on the steppes about the Ulu-kem.

Distribution: Europe, except the extreme north, the Caucasus, Siberia, northwards to about 60° north lat., and eastwards to Trans Baikal, Mongolia, northern China, south-western Asia to Afghanistan and Turkestan, the East Indies.

Medicago lupulina L. Spec. Pl. ed. II (1763) p. 1097; Ledeb. Fl. Alt. III, p. 251; Turczan. Cat. Baical. no. 295; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 205; Ledeb. Fl. Ross. I, p. 527; Turczan. Fl. Baical.-Dahur. (1842) p. 719, no. 283; Крыл. Фл. Алт. II (1903) p. 218.

In meadows on islets in the river Abakan, near Ust Abakansk. Collected with young flower-buds at the end of June. In the Urjankai country I have collected the species on dry hills near Tapsa.

Distribution: Europe, south-western Asia to Turkestan and Afghanistan, the East Indies, southern Siberia, Mongolia, northern China, North America (introduced).

Melilotus dentatus (Wallst. et Kit.) Persoon, Synops. Plant. II (1807) p. 384; Ledeb. Fl. Alt. III, p. 253; Ledeb. Fl. Ross. I, p. 535; Schulz, Monogr. *Melilotus* in Engler's Jahrb. B. 29, H. 5 (1901) p. 687; Крыл. Фл. Алт. II (1903) p. 219.

On the steppes on the Ulu-kem, between Bjelosarsk and Cha-kul. With ripe pods at the beginning of August. The leaves of this species resemble striking those of *Trifolium lupinaster.*

Distribution: South-eastern and middle Europe, northwards to southern Sweden, southern Siberia, eastwards to Trans Baikal, Turkestan.

Melilotus suaveolens Ledeb. Ind. Sem. Hort. Dorpat. (1824) p. 5; Turczan. Cat. Baical. no. 299; Ledeb. Fl. Ross. I, p. 536; Schulz, Monogr. *Melilotus* no. 5; Turczan. Fl. Baical.-Dahur. (1842) p. 722, no. 288; Крыл. Фл. Алт. II (1903) p. 220.

On the banks of the river Abakan, between Ust Kamuishto and Ust Abakansk. Flowering and with young pods at the end of June.

Distribution: Turkestan, Siberia, northwards to about 68° north lat., northern Mongolia, eastern Asia, the East Indies, Sakhalin, Japan.

Melilotus albus Medicus, Vorl. Churpf. Phys. Øk. Ges. II (1787) p. 382; Ledeb. Fl. Ross. I, p. 536; Schulz, Monogr. *Melilotus* no. 4; Крыл. Фл. Алт. II (1903) p. 221. *M. vulgaris* Willd. Enum. Hort. Berol. II (1809) p. 790; Ledeb. Fl. Alt. III, p. 255; Turczan. Cat. Baical. no. 298; Turczan. Fl. Baical.-Dahur. (1842) p. 722, no. 287.

Scattered on sandy river-banks, on islets in the rivers Yenisei and Abakan, and near Ust Kamuishto. The specimens collected are large and vigorous, about 1 m. high, with hollow stems, and large leaflets, to 30 mm. long and 14 mm. broad, the margins of which are sharply and irregularly serrate. The peduncle is, during the flowering, to 14 cm. long, of about the same length as the raceme itself, and the flowers 5—6 mm. long. Thus, these specimens seemed most properly to have to be referred to *f. argutus* (Reichenb.) Schulz, l. c. p. 696; *Melilotus argutus* Reichenb. Fl. Germ. Exc. II (1830—1832). The species flowers in the second half of June. In the Urjankai country I have collected the species past flowering and with pods at the beginning of September, near Cha-kul, on the banks of the river Ulu-kem.

Distribution: Europe, south-western Asia to India, Siberia, northwards to 68° north lat., and eastwards to about the government of Irkutsk; further to the east the plant is very rare, and probably introduced, Tibet, Mongolia, China (only near Peking), introduced into North America and Australia.

Trifolium pratense L. Spec. Pl. ed. II (1763) p. 1082; Ledeb. Fl. Alt. III, p. 256; Turczan. Cat. Baical. no. 301; Ledeb. Fl. Ross. I, p. 547; Turczan. Fl. Baical.-Dahur. (1842) p. 724, no. 290; Крыл. Фл. Алт. II (1903) p. 224.

Common in the territory explored, in thickets and in meadows about the rivers Yenisei and Abakan, on the islets in the said rivers, along the road between Kushabar and Minusinsk, in the Amyl valley, at Ust Algiac and Ust Sisti-kem. Most of the specimens collected have vigorous stems, 2—3 dm. high, and are sparsely clothed with appressed hairs, especially so under the heads. The stipules are glabrous, or sparingly beset with some few long, spreading hairs. The calyx is pubescent with appressed hairs. Near Kushabar I have collected some specimens of a form with vigorous, ascending stems densely beset with horizontally spreading or sometimes slightly retrorse hairs. The leaves are also rather much puberulent, especially so underneath, the petioles with dense, spreading hairs. The stipules nearly glabrous, save for the projected points, which are long-haired. As for the rest, like the preceding one. This form seemed, most properly, to have to be referred to *f. pilosum* HEUFFEL (Abh. Z. B. G. Wien VIII (1858) p. 88; ASCHERS. et GRAEBN. Fl. Nordostd. Flachl. p. 436). Taken flowering in June and July.

Distribution: Europe, south-western Asia to Cashmere, Siberia, in the Yenisei valley northwards to 68° north lat.

Trifolium medium L. Fauna Suec. ed. II, App. (1761) p. 558; Turczan. Cat. Baical. no. 300; Ledeb. Fl. Ross. I, p. 547; Turczan. Fl. Baical.-Dahur. (1842) p. 724, no. 289; Крыл. Фл. Алт. II (1903) p. 223.

On dry hills in thickets of foliage trees near Kushabar; flowering at the middle of July. The species is rare in eastern Siberia.

Distribution: Europe, Caucasia and eastwards to Persia, Siberia, eastwards about to the government of Irkutsk, Kamtchatka.

Trifolium lupinaster L. Spec. Pl. ed. II (1763) p. 1079; Ledeb. Fl. Alt. III, p. 258; Turczan. Cat. Baical. no. 304; Ledeb. Fl. Ross. I, p. 551; Turczan. Fl. Baical.-Dahur. (1842) p. 727, no. 293; Крыл. Фл. Алт. II (1903) p. 225.

Very common on islets in the rivers Yenisei and Abakan, especially in grass-grown meadows and in thickets, at Kushabar and in the subalpine taiga territory on the Amyl. Begins flowering in the second half of June. In the Urjankai country this species seemed to be widely distributed. In the Altaian I have found it right up to the tree limit, near Ust Algiac, Ust Sisti-kem, on the Kamsara, at Ust Tara-kem, Sebi, Buluk, Tapsa, and also on the Ulu-kem.

Distribution: From the eastern part of middle Europe throughout Siberia, eastwards to the Pacific Ocean, northwards to about 70° north lat., northern Mongolia, Turkestan.

Trifolium repens L. Spec. Pl. ed. II (1763) p. 1080; Ledeb. Fl. Alt. III, p. 256; Turczan. Cat. Baical. no. 302; Ledeb. Fl. Ross. I, p. 553; Turczan. Fl. Baical.-Dahur. (1842) p. 725, no. 291; Крыл. Фл. Алт. II (1903) p. 226.

Common in the tracts about the rivers Yenisei and Abakan, at Kushabar, in the Amyl valley, Ust Algiac, Ust Sisti-kem, in fields and waste grounds, where I have taken it in flower in June—August. All of the specimens collected belong to *f. typicum* Aschers. et Graebn. Synops. VI, 2 (1907) p. 498.

Distribution: Europe, south-western Asia to Afghanistan and Baloochistan, the Himalayas, Ceylon, Siberia, northwards to 68½° north lat., northern Mongolia, Japan, North America.

Lotus corniculatus L. Spec. Pl. ed. II (1763) p. 1092; Ledeb. Fl. Alt. III, p. 259; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 214; Ledeb. Fl. Ross. I, p. 560; Крыл. Фл. Алт. II (1903) p. 228.

Rather frequent on dry hills about Kushabar, and in the Amyl valley; scattered in the Urjankai country, at Tapsa, and on the banks of the Ulu-kem, between Bjelosarsk and Cha-kul.

Distribution: The species is distributed over Europe, and through south-western Asia to India, Afghanistan, the Himalayas, Tibet, south-western Siberia, northern Mongolia, Japan, North Africa, America, Australia.

Caragana pygmaea (L.) DC. Prodrom. II (1825) p. 268; Ledeb. Fl. Alt. III, p. 265; Turczan. Cat. Baical. no. 307; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 219; Ledeb. Fl. Ross. I, p. 570; Turczan. Fl. Baical.-Dahur. (1842) p. 731, no. 297; Крыл. Фл. Алт. II (1903) p. 232; Комаровъ, Монографія Рода *Caragana* in Act. Hort. Petropol. T. XXIX, Fasc. II (1909) p. 240.

Common about Minusinsk and on the Abakan Steppe, in steppe meadows, on stony, hot slopes, and the like, moreover on dry southern slopes about Ust Sisti-kem, and also on the steppes about the Ulu-kem. The species begins flowering in the first half of June. The material collected varies considerably, especially in the pubescence, floweriness, and breadth and length of the leaves. The leaves may be completely glabrous or rather densely hairy, with all transitions, the calyx also alternating between glabrous and densely pubescent. Sometimes the calyx may be only ciliate, glabrous for the rest. The pedicels vary from twice to three times the calyx in length. All intermediate forms seemed to occur here between the varieties *Pallasiana* Komar. l. c., *viridissima* Komar. l. c., and *angustissima* C. K. Schneid. (*C. incana* Bunge, *C. pygmaea β arenaria* Ledeb. Fl. Ross. I p. 571). The latter is of especially common occurrence about Ust Kamuishto, partly with leaves to 2 cm. long (*α longifolia* Komar. l. c.), partly with shorter leaves, only to 1 cm. long (*β brevifolia* Komar. l. c.). On the steppes about the Ulu-kem, between Buluk and Cha-kul, this species is also very frequent. Besides var. *angustissima* C. K. Schneid. there also occur, near Bjelosarsk, pretty typical specimens of var. *altaica* Komar. l. c.

Distribution: Southern Siberia, from the Altai region to Trans Baikal, north-eastern Mongolia, western China.

Caragana frutex K. Koch, Dendrologie I (1869) p. 48; Комар. Моногр. *Caragana* p. 224. *Caragana frutescens* DC. Prodrom. II (1825) p. 268; Ledeb. Fl. Alt. III, p. 265; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 218; Ledeb. Fl. Ross. I, p. 569; Крыл. Фл. Алт. II (1903) p. 231.

var. **latifolia** C. K. Schneid., Комар. l. c. p. 226.

In dry, grass-grown places on the Abakan Steppe, between Askys and Ust Kamuishto. In full flower about the middle of June.

Distribution: Russia, south-western Siberia to the government of Yeniseisk, western Mongolia, Dzungaria, Russian Turkestan, Manchooria, northern China, Japan (?).

Caragana spinosa DC. Prodrom. II (1825) p. 269; Ledeb. Fl. Alt. III, p. 266; Turczan. Cat. Baical. no. 308; Ledeb. Fl. Ross. I, p. 571; Turczan. Fl. Baical.-Dahur. (1842) p. 732, no. 298; Крыл. Фл. Алт. II (1903) p. 233; Комар. Моногр. *Caragana* p. 260.

On dry, hot steppes near the Tapsa, and on the Ulu-kem Steppe. Past flowering at the end of August.

Distribution: Southern Siberia and northern Mongolia; from Dzungaria to Trans Baikal.

Caragana jubata (Pall.) Poir. in Lamarck, Encyclop. Method. Supplem. II (1811) p. 89; Turczan. Cat. Baical. no. 309; Ledeb. Fl. Ross. I, p. 572; Turczan. Fl. Baical.-Dahur. (1842) p. 732, no. 299; Комар. Моногр. *Caragana* p. 287.

This very characteristic plant has not been collected by myself, but at Ust Tapsa I got some rather small specimens from a Russian lady, mrs. SAFIANOW by name. According to her statement, it occurs about 100 wersts south of Ust Tapsa, on river-banks, where attaining the height of a man. The specimens belong to *f. erecta* (REGEL) KOMAR.

Distribution: North-eastern Siberia, from the Arctic Ocean (at the mouth of the Lena) and the Sea of Okhotsk, westwards to Lake Baikal, the Sayansk mountains, Mongolia, China, Tibet, Turkestan.

Caragana Bungei Ledeb. Icon. etc. (1829) tab. 464; Ledeb. Fl. Alt. III, p. 264; Bunge, Enum. Alt. p. 63; Ledeb. Fl. Ross. I, p. 569; Крыл. Фл. Алт. II (1903) p. 231; Комар. Моногр. *Caragana* p. 317.

Pretty common on dry, rocky steppes about the Ulu-kem, from the Tapsa westwards to Cha-kul. Specimens collected at the end of August, are past flowering. This species constitutes, together with some few others, such as *Potentilla fruticosa, Caragana spinosa*, etc., the shrub-steppes, a plant society characteristic of the interior of Asia, where the shrubs, about 1 m. high, are scattered at regular intervals. The undergrowth chiefly consists of species of *Stipa* and other xeropile grasses (fig. 69, p. 98).

Distribution: The Altai, north-western Mongolia.

Caragana arborescens (Amm.) Lamarck, Encyclop. Method. I (1783) p. 615; Ledeb. Fl. Alt. III, p. 263; Bunge, Enum. Alt. p. 63; Ledeb. Fl. Ross. I, p. 569; Turczan. Fl. Bai-

cal.-Dahur. (1842) p. 730, no. 296; Крыл. Фл. Алт. II (1903) p. 230; Комар. Моногр. *Caragana* p. 321 *forma.*

Foliola, calyces et pedunculi molliter pilosi.

The leaves are 3—4 pinnate, the leaflets elliptic or obovate, to 2,2 cm. long, and 1,1 cm. broad. The flowers are about 2 cm. long, the peduncles, during the flowering, about twice as long, articulate immediately below the flowers. The young pods slightly pubescent.

Scattered about Minusinsk and the river Abakan, on hills etc. here and there accompanying *Rosa* sp. and with an undergrowth of *Fragaria viridis, Iris ruthenica, Aster alpinus, Solidago Virgaurea, Stellaria graminea,* and others. The species flowers here in the second half of May and the first half of June. Specimens collected at the beginning of June, bear already pods, about 3 cm. long. The species is also scattered in the Urjankai country, especially in open thickets of foliage trees, intermingled with larch, and the like, between Ust Sisti-kem and the Kamsara, near the Dora Steppe, on the Tapsa, and near the Ulu-kem, above Cha-kul.

Distribution: Southern Siberia, northwards to about 60° north lat., from the Altai region to Trans Baikal, northern Mongolia, southwards to about 48° north lat. It does not occur in China, Japan, and in the Okhotsk region.

Glycyrrhiza uralensis Fischer in DC. Prodrom. II, p. 248; Ledeb. Fl. Ross. I, p. 566; Turczan. Fl. Baical.-Dahur. (1842) p. 728, no. 294; Крыл. Фл. Алт. II (1903) p. 234. *G. glandulifera* Ledeb. Fl. Alt. III, p. 261. *G. glandulifera* Waldst. et Kit. *β grandiflora* Ledeb. Fl. Ross. I, p. 566.

Pretty common on the Abakan Steppe, between Ust Kamuishto and Ust Abakansk. Specimens collected here, at the end of June, are young, and as yet flowerless. Is also scattered between Minusinsk and Kushabar, and at Bjeloarsk, near the Ulu-kem, where I have collected it with pods at the end of August.

Distribution: The north of the Caucasus (on the river Kuma), Turkestan, through southern Siberia and northern Mongolia, eastwards to the Khingan mountains, and southwards towards Peking.

Güldenstädtia monophylla Fischer in Mem. Soc. Imper. Natural. Moscou T. VI (1823) p. 171; Ledeb. Fl. Alt. III, p. 260; Bunge, Enum. Alt. p. 63; Ledeb. Fl. Ross. I, p. 564; Крыл. Фл. Алт. II (1903) p. 235.

Only few specimens of this very rare plant have been collected by me, on sunny, dry rocks facing south, near the northern bank of the Ulu-kem, about 60—80 wersts east of Kemshik bom. Of the plants, taken September 1st, only the leaves and empty pods have been left.

Distribution: The plant has previously been found near the junction of the rivers Argut and Katun (Gebler), at Korketschu, near the Katun, between the rivers Uleghen and Tschuja (Ledeb.), and in Mongolia (Maximowicz).

Oxytropis glabra DC. Astragalogia (1802) no. 31; Turczan. Cat. Baical. no. 343; Bunge, Spec. *Oxytropis* (Mem. Acad. Imper. Sc. St. Petersbourg Ser. VII, T. XXII, no. 1 (1874) p. 40; Turczan. Fl. Baical.-Dahur. (1842) p. 758, no. 328; Крыл. Фл. Алт. II (1903) p. 249. *Oxytropis diffusa* Ledeb. Fl. Alt. III, p. 281; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 224; Ledeb. Fl. Ross. I, p. 585.

On the Abakan Steppe, near Ust Kamuishto, in moist, saliferous soil, and in the Urjankai country, near the Ulu-kem. With young flowers in the middle of June.

Distribution: South-eastern Russia and adjoining parts of Asia to Turkestan, southern Siberia, except the most eastern parts, northern Mongolia.

Oxytropis pilosa (L.) DC. Astragalogia (1802) no. 27; Bunge, Spec. *Oxytropis* (1874) p. 58; Ledeb. Fl. Alt. III, p. 280; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 223; Ledeb. Fl. Ross. I, p. 584; Крыл. Фл. Алт. II (1903) p. 251.

On the Abakan Steppe, near Ust Abakansk, on dry, open steppe, and on dry, sunny rocks. Partly done flowering at the end of June.

Distribution: Europe, northwards to southern Sweden, southern Siberia, eastwards to the government of Irkutsk.

Oxytropis uralensis (L.) DC. Astragalogia (1802) p. 55; Bunge, Spec. *Oxytropis* (1874) p. 104 p. p.; Ledeb. Fl. Alt. III, p. 280; Turczan. Cat. Baical. no. 317; Ledeb. Fl. Ross. I, p. 593; Turczan. Fl. Baical.-Dahur. (1842) p. 738, no. 304; Крыл. Фл. Алт. II (1903) p. 262. *Astragalus uralensis* L. Spec. Pl. ed. II (1763) p. 1071; Pall. Spec. *Astragal.* (1800) p. 53.

On cliffs on the Abakan Steppe, near Ust Kamuishto. Flowering in the second half of June.

Distribution: Siberia, eastwards to Lake Baikal, northern Mongolia.

Oxytropis tragacanthoides Fischer in DC. Prodrom. II, p. 280; Bunge, Spec. *Oxytropis* (1874) p. 131; Ledeb. Fl. Alt. III, p. 278; Ledeb. Fl. Ross. I, p. 583; Крыл. Фл. Алт. II (1903) p. 271.

This very characteristic species occurs on stony declivities near Minusinsk. Flowering and past flowering in the early days of July.

Distribution: The Altai region, northern Mongolia.

Oxytropis aciphylla Ledeb. Fl. Alt. III, p. 279; Ledeb. Fl. Ross. I, p. 584; Bunge, Spec. *Oxytropis* (1874) p. 134; Крыл. Фл. Алт. II (1903) p. 272.

On dry, sandy places on the Ulu-kem Steppe, between Bjelosarsk and Cha-kul.

Distribution: Altai and Sayansk districts, Mongolia.

Oxytropis muricata (Pall.) DC. Astragalogia (1802) p. 69; Bunge, Spec. *Oxytropis* (1874) p. 153; Turczan. Cat. Baical. no. 340; Ledeb. Fl. Ross. I, p. 580; Turczan. Fl. Baical.-Dahur. (1842) p. 755, no. 324; Крыл. Фл. Алт. II (1903) p. 276. *Astragalus muricata* Pall. Spec. *Astragal.* (1800) p. 89.

On the Abakan Steppe, on rocks, and in sandy places near the lower part of the river. Partly done flowering at the end of June.

Distribution: From the eastern part of the Altai through southern Siberia to Trans Baikal.

? Oxytropis ammophila Turczan. in Bullet. Soc. Natural. Moscou (1840) p. 66; Ledeb. Fl. Ross. I, p. 595.

On the Abakan Steppe I have collected a rather rich material of a species of *Oxytropis*, which — not without having my doubts, however — I have referred to *O. ammophila*, the specimens being too young for a reliable decision. This plant is very common on the steppes between Minusinsk and Ust Abakansk, where being a characteristic plant in dry, sandy places, together with *Thermopsis lanceolata*, *Onosma echioides*, etc. Collected with flower-buds and young flowers in the first half of August. During a stay in Petrograd, Prof. Dr. B. FEDTSCHENKO, the noted student of Leguminous plants, declared my determination to be very probable.

Distribution: Southern Siberia (the government of Yeniseisk).

Oxytropis stenophylla Bunge, Enum. Alt. (1836) p. 65; Bunge, Spec. *Oxytropis* (1874) p. 122; Ledeb. Fl. Ross. I, p. 583; Крыл. Ф.і. Алт. II (1903) p. 266. *O. pumila* Ledeb. Fl. Alt. III. p. 275.

subspec. **caulescens** *subspec. nov.* [Tab. XIII, Fig. 2].

Radix crassa, valida, lignosa, 15-20 cm. longa. Folia 6-9 cm. longa, 3-5 juga; foliola linearia, 1-2 mm. lata, 12-25 mm. longa, fere aequilata, saepe leviter curvata, complicata, apice acuminata, nunquam mucronata, supra parce albi-pilosa, nonnunquam fere omnino glabra, subtus semper omnino glabra, margine distincte revoluta, pilis albis, rigidis dense ciliata. Stipulae parvae, membranaceae, connatae, supra partim liberae obtusae, marginibus pilosae. Scapus 6-9 cm. longus, foliis fere aequilongus, teres, crassior et validior, pilis albis, longis, adpressis sparse vestitus, uni - triflorus. Bracteae herbaceae, longe obovatae vel ovato-lanceolatae, 7-8 mm. longae, plus minus dense ciliatae, ceterum omnino vel fere omnino glabrae. Flores cum ceteris comparati magni. Calyx tumens, 12-15 mm. longus, membranaceus, albidi-fulvus, lanugine alba, molli, patula vestitus, pilis brevis, nigris, adpressis interspersis. Vexillum alas superans, 26-30 mm. longum, lamina ovata, apice levissime emarginata, unquis 12-14 mm. longus, 2 mm. latus, aequilatus. Alae antice latissimae et in lacinias inaequales leviter fissae, postice paulatim angustiores et supra unquem lacinia parva, rotundata praeditae. Carina curvata, 20 mm. longa, apice mucrone tenui, 3 mm. longo, projecto. Legumen calycem rumpens, obovatum, 15-18 mm. longum, pilis densis, longis, albis vel pallide ferrugineis, apice villo nigro vestitum. Semina 10-15 in singulis leguminibus, reniformia, glabra, fusco-nigra, 2-2,5 mm. longa.

In point of external habitus our plant differs rather much from the typical species, chiefly owing to the long, vigorous scape, while in BUNGE's authentic specimens, which I have seen in the herbarium of the Imperial Botanical Gardens in Petrograd, however,

there can generally be pointed out a very short scape, only one or a couple of mm. long. Moreover, this subspecies is characteristic in having the leaves long and rather vigorous, of about the same length as the scape, viz. 6—9 cm. The leaves are generally 3- or 4- rarely 5-pinnate. The petiole, which is slightly channelled, is — like the scape — more os less distinctly erect, not curved as is frequent in the typical species. The pinnae are generally not opposite, but mostly alternate down the rachis. The leaflets are attached by a distinct, narrow node, which is very fragile, at any rate when dried, and is apt to break, so that the leaflets fall off. In preserved material of this one, as also of the typical species, all, or nearly all, of the pinnae will generally have fallen off, the rachis only being left. Thus in BUNGE'S authentic specimens nearly all of the leaflets had fallen off. The juncture of the leaflets, however, are, distinctly visible in the small, inflated knots. The leaflets themselves are rather fleshy, linear, straight, or slightly curved, about 2 mm. broad, and 12—25 mm. long, nearly equally narrow throughout their length, tapering towards the base and summit, gradually pointed and acute, but never mucronate . The margin of the leaflets is distinctly revolute, frequently so much as to make the margins touch each other, whereby the under side of the leaf is at times complety shut in. It is to be supposed that this more or less strongly marked recurvation of the margins is dependent on the turgor, and that this plant, growing on very hot, dry, sunny Devonian sandstone cliffs in a marked steppe climate, has through this, a means of regulating the transpiration. The upper side of the leaflets is sparingly pubescent, sometimes completely glabrous; the margin is always much and distinctly ciliate, the under side always completely glabrous, whereby the subspecies *caulescens* is also distinct from the typical species, recorded to be hairy beneath. The stipules are small, membranous, adnate to the petiole, the subobtuse apex only being free, and distinctly ciliate. The scape is of about the same length as the leaves, 6—9 cm. long, villous-pubescent, with white, appressed hairs, occurring much more sparingly than in the typical species, the very short scapes of which are always rather densely hairy. The bracts are 7—8 mm. long, mostly of a green colour, sometimes more pallid and membranous, always nerveless, oblong-ovate to broadly lanceolate, glabrous, only ciliate. Only very rarely there are to be found on the bracts some few white hairs, while, in the typical species, they are always densely and distinctly pubescent. The calyx is membranous, of a light yellowish brown, inflated, 12—15 mm. long, with equally large, very narrow, mucronate teeth, the length of which is 4—5 mm. The calyx is rather densely pubescent, with long, white hairs, intermixed with finer, shorter, curved, nearly black hairs. Similar short, black hairs are also to be found here and there on the scape, but are here of very rare occurrence, and nearly exclusively near the upper end. The pedicels are very short, 2—4 mm. long, so that the flowers, to be found in a number of 1—3, become densely congested. The pedicels are rather densely pubescent, like the calyx. The flowers are comparatively large. As all of the specimens collected were already past flowering, I cannot express any opinion on their colour. Owing to the ripening of the fruit, however, the corolla is broken off by the pod gradually growing out, and remains

for a long time as withering remains near the summit of the latter. The standard is longer than the wings, 26—30 mm. long; the claw equally broad, about 2 mm. in breadth, and 12—14 mm. in length, the plate ovate and emarginate at the apex. The wings are about 20 mm. long; their claws are very narrow, only about 0,3 mm. broad, 11—13 mm. long, the plates broadest near the apex, where slightly incised into 2 unequally large lobes; hindmost, where passing into the claw, they are provided with a rounded lobe. The keel is about 20 mm. long, at the apex furnished with a protruding beak, 2—3 mm. long. The pods, bursting the calyx rather early during their development, are ovoid, 15—18 mm. long, densely pubescent, with long, white, or light rusty brown hairs, near the summit, at the base of the persistent style, with a tuft of black hairs. The seeds are to be found in a number of 10—15 in each pod; they are reniform, glabrous, dull, of a brownish black colour, 2—2,5 mm. long, and, accordingly, nearly twice as large as in the typical species.

Collected by me on the Abakan Steppe, near Askys, on dry Devonian sandstone cliffs facing south. The specimens taken in the middle of June are past flowering, with ripe and partly ripe pods.

Distribution: The main species is very rare and is previously known only from 2 places, viz. on the river Tsharysh, and near the mouth of the river Kan in southern Siberia (Bunge).

Astragalus alpinus L. Spec. Pl. ed. II (1763) p. 1070; Pallas, Spec. *Astrag.* (1800—02) p. 41, t. 32; Bunge, Gener. *Astrag.* II (Mem. Acad. Imp. Sc. St. Petersb. Ser. VII, T. XV, 1870) p. 26; Turczan. Cat. Baical. no. 345; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 237; Ledeb. Fl. Ross. I, p. 601 ex parte; Turczan. Fl. Baical.-Dahur. (1842) p. 761, no. 332; Крыл. Фл. Алт. II (1903) p. 298. *Phaca astragalina* DC. Astragalogia p. 52; Ledeb. Fl. Alt. III, p. 270.

On the banks of the Bei-kem, between Sebi and Utinski porog, in shady places, among blocks of stone. Partly done flowering in the second half of August.

Distribution: Arctic and alpine regions of Europe, Novaya Zemlya, Siberia, Turkestan, northern Mongolia, western Tibet, arctic America.

Astragalus frigidus Bunge, Gener. *Astrag.* p. 28; Крыл. Фл. Алт. II (1903) p. 299. *Phaca frigida* L. Syst. Nat. ed. 10 (1759) p. 1173; Ledeb. Fl. Alt. III, p. 268; Turczan. Cat. Baical. no. 311; Ledeb. Fl. Ross. I, p. 575; Turczan. Fl. Baical.-Dahur. (1842) p. 735, no. 301.

In the Altaian, on the Upper Sisti-kem, in alpine meadows and on mountain slopes, and in the Bei-kem valley, near Utinski porog.

Distribution: Arctic and alpine tracts of Europe, arctic Siberia, the Altai and Sayansk mountains, the Himalayas, North America.

Astragalus hypoglottis L. Mant. p. 264; Turczan. Cat. Baical. no. 347; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 233; Ledeb. Fl. Ross. I, p. 602; Turczan. Fl. Baical.-Dahur. (1842) p. 763, no. 334; Bunge, Gener. *Astrag.* p. 83; Крыл. Фл. Алт. II (1903) p. 304.

var. **dasyglottis** Ledeb. Fl. Alt. III, p. 293; Ledeb. l. c. p. 603; Крыл. l. c. p. 305. *A. dasyglottis* Fisch., Bunge, Enum. Alt. no. 268; Karel. et Kiril. l. c. no. 234; Bunge, Gener. *Astrag.* p. 84.

On the Ulu-kem Steppe, between Bjelosarsk and Cha-kul.

Distribution: The above variety is distributed over southern Siberia, eastwards to the government of Irkutsk.

Astragalus Alopecurus Pallas, Spec. *Astrag.* p. 11; Bunge, Gener. *Astrag.* p. 96; Крыл. Фл. Алт. II (1903) p. 306. *Astragalus alopecuroides* Ledeb. Fl. Alt. III, p. 318; Ledeb. Fl. Ross. I, p. 633.

In dry meadows near the Yenisei, above Minusinsk. In flower in the first half of July.

Distribution: South-eastern Russia, southern Siberia, eastwards to about the government of Yeniseisk.

Astragalus uliginosus L. Spec. Pl. ed. II (1763) p. 1066; Pallas, Spec. *Astrag.* p. 31; Bunge, Gener. *Astrag.* p. 168; Ledeb. Fl. Alt. III, p. 317 (excl. synon. Marsch.-Bieb.); Turczan. Cat. Baical. no. 358; Ledeb. Fl. Ross. I, p. 604; Turczan. Fl. Baical.-Dahur. (1842) p. 772, no. 347; Крыл. Фл. Алт. II (1903) p. 306.

In moist meadows on islets in the Yenisei, near Ust Abakansk. Young flowers in the early days of July.

Distribution: Siberia, northern China, and Corea.

Astragalus testiculatus Pallas, Spec. *Astrag.* p. 82; Bunge, Gener. *Astrag.* p. 197; Turczan. Cat. Baical. no. 362; Ledeb. Fl. Ross. I, p. 655; Turczan. Fl. Baical.-Dahur. (1842) p. 775, no. 351; Крыл. Фл. Алт. II (1903) p. 316. *Astragalus lactiflorus* Ledeb. Fl. Alt III, p. 333 ex parte. *Astragalus amygdaliger* Lessing, Ledeb. Fl. Ross. I, p. 657.

Scattered on the steppes between Minusinsk and Ust Abakansk. In flower and partly done flowering in the first half of June. The colour of the flowers varies between yellow and light red, with all transitions.

Distribution: Southern Russia, Caucasia, Trans Caucasia, Turkestan, through southern Siberia, eastwards to the government of Irkutsk.

Astragalus fruticosus Pallas, Spec. *Astrag.* p. 21; Bunge, Gener. *Astrag.* p. 216; Ledeb. Fl. Alt. III, p. 303; Turczan. Cat. Baical. no. 357; Ledeb. Fl. Ross. I, p. 632; Turczan. Fl. Baical.-Dahur. (1842) p. 770, no. 345; Крыл. Фл. Алт. II (1903) p. 318. *Astragalus viminalis* Pallas, Bunge, l. c. p. 217.

Near Ust Abakansk, on stony declivities on the steppes; past flowering at the beginning of June. In the Urjankai country, on dry declivities at Ust Kamsara.

Distribution: Siberia, northern Mongolia.

Astragalus stenoceras C. A. Meyer in Bongard et Meyer, Supplem. Fl. Alt. p. 24; Bunge, Gener. *Astrag.* p. 221; Ledeb. Fl. Ross. I, p. 629; Turczan. Fl. Baical.-Dahur. (1842) p. 771, no. 346; Крыл. Фл. Алт. II (1903) p. 32. *Astragalus subulatus* β Pallas, Spec. *Astrag.* p. 23. *Astragalus ceratoides* Bunge α *campestris* Ledeb. Fl. Alt. III, p. 306.

On the steppes between Minusinsk and Ust Abakansk, in sandy places, and on the Abakan Steppe, near Askys, on stony declivities; in flower and partly done flowering in the first half of June.

Distribution: South-eastern Russia (Orenburg), Russian Turkestan, southern parts of Siberia, eastwards to the government of Yeniseisk.

Astragalus melilotoides Pallas, Spec. *Astrag.* p. 51; Bunge, Gener. *Astrag.* p. 21; Ledeb. Fl. Alt. III, p. 298; Turczan. Cat. Baical. no. 353; Ledeb. Fl. Ross. I, p. 617; Turczan. Fl. Baical.-Dahur. (1842) p. 768, no. 341; Крыл. Фл. Алт. II (1903) p. 289.

In sandy, grass-grown places near the Tapsa, and on the steppes on the Ulu-kem, at Bjelosarsk. Past flowering at the end of August.

Distribution: From the eastern part of the government of Tomsk through Siberia to Trans Baikal, northern Mongolia, northern China.

Astragalus sulcatus L. Spec. Pl. ed. II (1763) p. 1065; Bunge, Gener. *Astrag.* p. 23; Ledeb. Fl. Alt. III, p. 302; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 242; Ledeb. Fl. Ross. I, p. 619; Крыл. Фл. Алт. II (1903) p. 293. *Astragalus leptostachys* Pallas, Spec. *Astrag.* p. 50; Turczan. Fl. Baical.-Dahur. (1842) p. 769, no. 343.

subspec. **Turczaninowi** *subspec. nov.* [Tab. IX].

Ab forma typica differt caulibus humilibus, tantum 20-25 cm. - raro ad 30 cm. - altis, ad basin lignosis, suffrüticosis, adscendentibus, inferne leviter superne altius sulcatis, glabris vel leviter pilosis. Folia sessilia, impari-pinnata, 5-8 juga; foliola inferiorum latiora ovata vel fere rotundata, 3-5 mm. lata, 3-8 mm. longa, foliola superiorum angustiora, quater-decies longioribus quam latis. Racemi axillares tenerrimi et gracillimi, rigidi, erecti, 5-10 cm. longi, foliis duplo longiores, sparsiflori, pauciflori, vulgo 7-10 flori. Structura florum praecipue distinctus alis latioribus antice latissimis et distincte emarginatis. Tota planta laete viridis.

The specimens of *Astragalus sulcatus* L. collected by me on the Abakan Steppe, near Ust Kamuishto, differ in some respects so much from the typical plant that I have found it necessary to enter it as a new subspecies. Already in 1842, Turczaninow, l. c. called attention to the fact that specimens of this one from Baikal differ from material from the Altai by frequently having the wings indented. „Planta nostra ab Altaica parum recedit alis plerumque emarginatis, sed in eodem individuo etiam integrae inveniuntur". To judge from my material, however, the wings also differ considerably in the shape — which will appear from the annexed figure — being broader thon in the typical species, and always emarginate at the apex. There are also other differences, which will appear from the following description: The stems are several, ascending at the base, frequently ligneous, low, only 20—25 cm. high, as a rare exception to 30 cm. high, which is only about half

the length of the stems in the typical plant. The stems are slightly furrowed at the base, higher up more deeply striate, sparingly pubescent, or sometimes nearly glabrous, with rather approximate leaves. The leaves are sessile, 4—5 cm. long, generally 7-pinnate, only rarely to 11-pinnate. There is a marked difference between the leaves in the lower and upper parts of the plant. Thus, the leaflets in the lowest leaves are broader, ovate or oval, 3—5 mm. broad, one and a half to twice as long, slightly emarginate or subobtuse at the apex. In the upper leaves, the leaflets become gradually narrower, only 1—2 mm. broad, 4—10 times as long. The greatest length of the leaflets does not exced 15 mm. Their shape is linear to broadly linear, rather equally broad throughout their length, obtusely rounded at the apex, truncate, or rarely slightly emarginate. The leaflets have short stalks, 0,5—1 mm. long. The upper side of the leaves is generally glabrous or only very slightly hairy, the under side always slightly hairy, especially so along the midvein. The stipules are small, 2—3 mm. long, triangular, glabrous or slightly ciliate, quite detached, by no means adnate to the petiole. The raceme is very long-peduncled, rigid and straight, but thin and tender, 5—10 cm. long, about twice exceeding the axillary leaf, loosely flowered, generally 7- to 10-flowered, only rarely with to 14—15 flowers, especially the lower ones, rather distant. The bracts are small, 1—2 mm. long, of about the same length as the pedicels, membranous, or of a pale green, subulate and acutish, sparingly pubescent and ciliate, frequently with a tuft of black or white hairs at the apex. The pedicels 1—2 mm. long, sparingly pubescent. The calyx is about ⅓ of the length of the corolla, beset with scattered black and white hairs, divided above into 5 narrow, equal teeth. The corolla is 8—10 mm. long, of a light violet or lilac. The standard is nearly ovate, 8—10 mm. long, slightly emarginate, with at short and broad claw. The wings are 6—7 mm. long, broader than in the typical form, especially at the apex, where

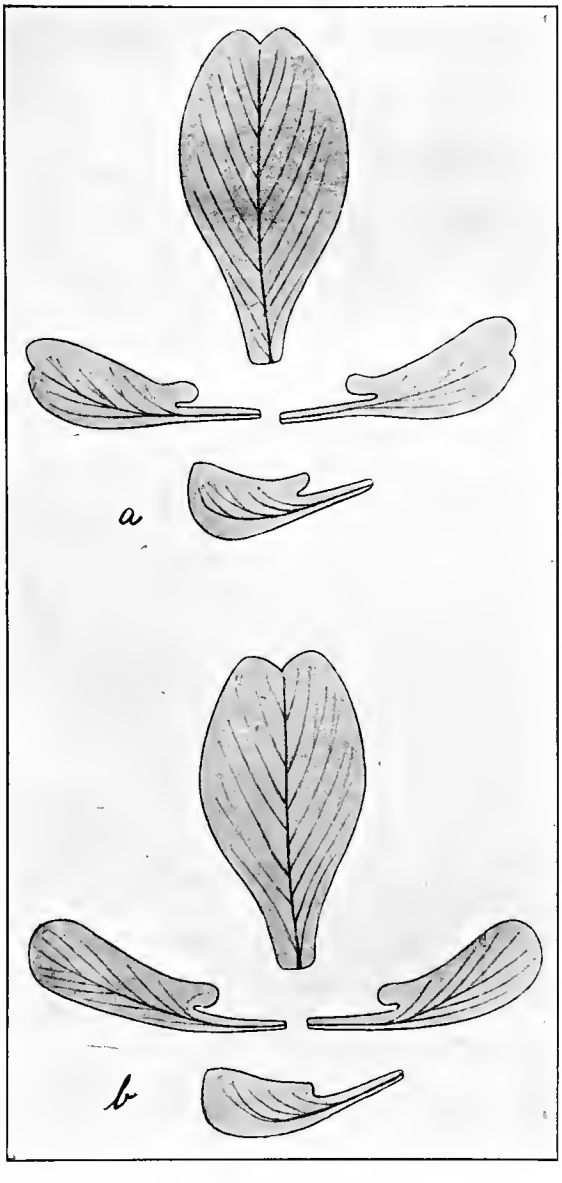

Fig. 95. a. Petals of *Astragalus sulcatus* L. subspec. *Turczaninowi* nov. subspec. from the Minusinsk district. — b. Petals of the typical *Astragalus sulcatus* L. from the middle Europe. (5/1).

indented, sometimes very slightly, but always so distinctly that — when considering this character — I have never felt a doubt whether even an isolated flower belonged to the typical plant or to the subspecies *Turczaninowi*. The keel is about 5—5,5 mm. long, and hindmost, where passing into the claw, furnished with an incision, so as to form a very characteristic appendage, not observed by me in specimens of the typical plant. See fig. 95. The whole plant is of a fresh green colour. Having taken only flowering specimens, I do not know whether the pods and seeds differ from the typical species.

This plant has been found by me on the Abakan Steppe, near Ust Kamuishto. In full flower at the end of June. The typical *A. sulcatus* does not occur in my collections.

Distribution: *A. sulcatus* is distributed from the south-eastern part of middle Europe (Austro-Hungary), southern Russia (?), throughout southern Siberia, eastwards to Trans Baikal. Subspec. *Turczaninowi* is probably confined to the eastern geografical range of the species.

Astragalus multicaulis Ledeb. Fl. Alt. III, p. 295; Bunge, Gener. *Astrag.* p. 22; Turczan. Cat. Baical. no. 350; Ledeb. Fl. Ross. I, p. 606; Turczan. Fl. Baical.-Dahur. (1842) p. 765, no. 337; Крыл. Фл. Алт. II (1903) p. 291. *Astragalus bifidus* Turczan. Pl. Exs; Bunge, l. c. p. 22.

The specimens are characteristic in having the stems numerous, commonly 4—8, rather short, generally only about 20 cm. long, prostrate, sometimes slightly zigzaggy at the nodes, rigid, ramified, with numerous, more or less spreading branches, of a yellowish white colour below, where frequently more or less ligneous, higher up of a greyish green or dark green, sometimes nearly bluish colour. Their lower parts are rather densely puberulent, with, short, stiff, white, appressed hairs; in the upper parts the stems become more sparingly puberulent, and gradually shot with black hairs increasing in number, so that the upper parts of the plants, as peduncles, pedicels and calyces, especially the last-mentioned ones, are nearly exclusively beset with, black hairs. Some of the marcescent stems from the year before are remaining, and give, together with the spreading branches and the slightly crooked stems, this plant a bushy appearance. The shape of the pinnae is subjected to great variations. In my material, all taken within a comparatively confined area, may be distinctly distinguished between a form with broad leaflets and another with narrow ones. Most of the specimens belong either to one or the other of these types, intermediate forms also occur, but being comparatively few in number. In the broadly leaved form, which I separate under the name of *f. latifolia*, the leaflets are narrowly elleptic, 2—4 mm. broad, and 3—4—5 times as long, broadest in the middle, tapering towards both ends, subobtuse or truncate at the apex. The margin of the leaflets is generally flat, only rarely slightly revolute.

In the narrowly leaved form — which I refer as *f. angustifolia* — the leaflets are linear to subulate, distinctly acuminate at the summit, and frequently produced into a fine mucro, sometimes to several mm. long. The margin of the leaflets is generally very distinctly recurvate, or the whole leaflets sometimes involute. In both forms the leaflets

are shortly stalked, the stalks scarcely exceeding 1 mm. in length; the leaflets are furnished with a prominent midvein, without distinct lateral veins, glabrous, or scattered pubescent along the veins beneath. The stipules are generally rather large; the lower ones are wholly united or nearly so, sometimes almost amplexicaul, only with 2 small, free lobes at the margin; the upper stipules are less united, generally only at the base, and are free above, forming pointed, triangular, membranous, yellowish white lobes, 2 to 3,5 mm. long, without distinct veins; they are glabrous or sligthly ciliate. The raceme is long, 5—10 cm. in length, twice to three times exceeding the axillary leaf, curved, not straight and rigid, rather densely flowered, and flowery. The number of the flowers in each raceme is generally 20—25, more rarely to 30, shortly pedicelled, the length of the pedicels being about 1 mm. The bracts are 3—4 times as long as the pedicels themselves, of a narrow, nearly subulate shape, slightly membranous, and in their lower parts with an indistinct vein. The calyx is 3—4 mm. long, divided above into 5 free, linear lobes of equal breadth, and of about the same length as the calyx-tube itself. The calyx as well as the pedicel are beset with black, scattered hairs. The flowers, which are about 10 mm. long, are of a light azure colour. The standard is about 10 mm. long, and 5—6 mm. broad, 2-cleft at the apex. The wings are 2—3 mm. shorter, and the apex distinctly and deeply emarginate. The keel is only about 5—5,5 mm. long, furnished with a short claw, which is only ⅓ of the length of the keel itself. The standard and the wings are of one colour; the keel has on either side, near the apex, a small blotch, about 1 mm.^{2} large, of a darker blue, giving the whole raceme a characteristic, variegated appearance.

This species has not been noticed by me with ripe fruits; the unripe pods are of a dull brown colour, slightly acuminate at the summit, with 4—7 seeds. The whole plant is of a characteristic, greyish green colour.

Occurring on the Abakan Steppe, near Askys, on dry, hot Devonian sandstone rocks facing south, where taken by me in flower, and in part done flowering in the middle of June.

Distribution: From the Thian-Shan and the Altai, through eastern Siberia to the Sea of Okhotsk.

Vicia sepium L. Spec. Pl. ed. II (1763) p. 1038; Ledeb. Fl. Alt. III, p. 351; Turczan. Cat. Baical. no. 379; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 277; Ledeb. Fl. Ross. I, p. 669; Turczan. Fl. Baical.-Dahur. (1842) p. 792, no. 368; Крыл. Фл. Алт. II (1903) p. 330.

Very common in meadows and thickets of foliage trees on islets in the rivers Yenisei and Abakan, where it begins flowering in the first half of June. The species is also rather frequently to be met with between Minusinsk and Kushabar. The specimens have, for the greater part, small, ovate or oval leaflets, to 3,5 cm. long, and 1,4 cm. broad, with truncate or even slightly emarginate apex, furnished with a fine point. The calyx is beset with short, spreading hairs, and has the teeth remarkably small. Specimens with comparatively long and small, nearly lanceolate leaflets, and rather large, toothed stipules are also to be found in the material brought home.

Distribution: Europe, Siberia, northwards to about the Arctic Circle, and eastwards roughtly to Lake Baikal, south-western Asia, Cashmere.

Vicia amoena Fischer in DC. Prodrom. II (1825) p. 355; Ledeb. Fl. Alt. III, p. 343; Turczan. Cat. Baical. no. 372; Ledeb. Fl. Ross. I, p. 672; Turczan. Fl. Baical.-Dahur. (1842) p. 788, no. 362; Крыл. Фл. Алт. II (1903) p. 330.

It appears from the rather rich material collected that this species is subjected to great variations in nearly every respect. KORSHINSKY (Acta Hort. Petropol. XII, p. 323) separates 3 forms of this one from eastern Asia, viz. *f. typica* REGEL, *f. oblongifolia* REGEL, and *f. glabra* KORSH. (without diagnosis). The same forms also occur in my material, but as all transitions and combinations are to be found between them, it is quite impossible to separate distinct forms with well defined characters, and the decision where the lines between them should be drawn, thus becomes a mere matter of judgement. Firstly, as to the hairiness there are to be found all transitions between specimens with dense hairs and nearly quite glabrous ones. The leaves are 5—10 pinnate, and the leaflets vary in shape from broadly ovate through all transitions to very lengthened, up to 6 times as long as broad. Some leaflets are of about equal breadth throughout their lenght, others are broadest in the middle, and tapering to the ends, or they are nearly lanceolate and acuminate, tapering upwards from a broader base. The apices of the leaflets are generally broadly rounded, or they may be nearly truncate, or even slightly emarginate; others are more or less acuminate and mucronate. For the rest, the leaflets vary very considerably in shape and size, even in the very same plant. In my material the maximal length of the leaflets is 3,3 cm., and the corresponding breadth 1,5 cm. Leaves with broad leaflets have, as a general rule, few pairs, and leaves with narrower leaflets more pairs. The pubescence of the leaflets is, like that of the stem, much varying. The stipules are larger or smaller, with the margin entire or toothed. It is, moreover, a rather characteristic fact that the leaflets frequently are not opposite, but often alternate. The flowers, which are to be found in a number of 10—15 in each raceme, are 15—18 mm. long. The raceme is about twice as long as the axillary leaf. The length of the pedicels is 2—3 mm., and the bracts, which, by the way, are deciduous early in season, vary from being small, fine, filiform to attaining a length of over 10 mm., thus by far overtopping the pedicel itself. The species is of very common occurrence on islets in the rivers Yenisei and Abakan, especially in meadows and in thickets, where I have collected it in full flower in June. Besides, I have found the species to be rather common in the Urjankai country, about Ust Sisti-kem, at Ust Kamsara, and Ust Tara-kem.

Distribution: Southern and south-eastern Siberia, northwards to about 61½° north lat., northern Mongolia, China, Manchooria, Corea, Sakhalin, Japan.

Vicia megalotropis Ledeb. Fl. Alt. III, p. 344; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 271; Ledeb. Fl. Ross. I, p. 674; Крыл. Фл. Алт. II (1903) p. 331.

var. **typica** Trautv. Catal. *Viciear.* Ross. in Act. Hort. Petropol. III (1874) I, p. 50; Крыл. l. c.

In shady thickets near the banks of the Lower Sisti-kem, and at Ust Tara-kem. The specimens are partly past flowering in August.

var. **multicaulis** (Ledeb.) Trautv. l. c. Крыл. l. c. *V. multicaulis* Ledeb. Fl. Alt. III, p. 345; Turczan. Cat. Baical. no. 378; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 272; Ledeb. Fl. Ross. I, p. 678; Turczan. Fl. Baical.-Dahur. (1842) p. 789, no. 365.

In open woods of birch and other foliage trees near the river Abakan. Young flowers in the middle of June. Varies considerably as to the pubescence.

Distribution: The species is distributed in eastern Russia, Russian Turkestan, southern Siberia, northern Mongola.

Vicia cracca L. Spec. Pl. ed. II (1763) p. 1035; Ledeb. Fl. Alt. III, p. 349; Turczan. Cat. Baical. no. 376; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 275; Ledeb. Fl. Ross. I, p. 674; Turczan. Fl. Baical.-Dahur. (1842) p. 790, no. 366; Крыл. Фл. Алт. II (1903) p. 333.

Common in thickets and meadows in the tracts about the rivers Yenisei and Abakan, at Karatus and Kushabar, in subalpine wooded tracts along the Amyl, at Ust Algiac, near Ust Sisti-kem, and at Ust Tara-kem.

The specimens collected vary considerably as to the pubescence and the floweriness. The specimens are generally rather flowery, the raceme is sometimes considerably longer than the axillary leaf, and the number of the flowers varying between 12 and 35, as a rule 20—25. The corolla is 11—12 mm. long. The number of the leaflets is 16—20. As to the pubescence there seemed to occur all transitions between *f. genuina* Trautv. l. c. and *f. canescens* Trautv. l. c., which both of them are only to be considered as modifications in consequence of the habitats. The latter form seemed to be the most frequent one in the steppe region about the river Abakan, upon the whole in dry places, the former in the wooded tracts and in more humid habitats. In thickets on the banks of the Yenisei, near Minusinsk I have collected specimens of *f. lilacina* (Ledeb.) Trautv. l. c. (*V. lilacina* Ledeb. Fl. Alt. III, p. 348; Ledeb. Fl. Ross. I, p. 675; Крыл. l. c.), and between Karatus and Kushabar specimens of a white flowered form, *f. albiflora* Trautv. l. c.; Крыл. l c. In subalpine wooded tracts about the Upper Amyl I have collected a slender and fine form with comparatively few pinnae, and each specimen only with one raceme, containing 6—8 flowers, the corollas of which are comparatively smaller, only 9—10 mm. long. Seemed to agree well with *f. depauperata* Domin in Fedde, Repert. I (1906) p. 13. The species has been found in flower from June to August.

Distribution: Europe, the Caucasus, Asia Minor, Turkestan, Siberia, northern Mongolia, northern China, Corea, Sakhalin, Japan, North Africa, North America, Greenland.

Vicia costata Ledeb. Fl. Alt. III, p. 346; Ledeb. Fl. Ross. I, p. 677; Крыл. Фл. Алт. II (1903) p. 335.

On open, rocky slopes on the river Ulu-kem; with partly empty pods at the end of August.

Distribution: Southern Siberia and northern Mongolia, about from Semipalatinsk to towards Lake Baikal.

Vicia silvatica L. Spec. Pl. ed. II (1763) p. 1035; Ledeb. Fl. Alt. III, p. 347; Turczan. Cat. Baical. no. 375; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 273; Ledeb. Fl. Ross. I, p. 676; Turczan. Fl. Baical.-Dahur. (1842) p. 787, no. 361 (misprint 861); Крыл. Фл. Алт. II (1903) p. 334.

In woods of foliage trees near Kushabar, and also on the river Amyl, near Petropawlowsk. The specimens are characteristic in having the leaflets comparatively small and broadly ovate, 4—13 mm. in length, and 3—6 mm. in breadth. The raceme is vigorous, considerably longer than the axillary leaf, flowery, commonly with 20—30 flowers. The apex of the keel is of a deep violet colour. In full flower in the middle of July.

Distribution: The greater part of Europe, Siberia, eastwards to Trans Baikal, and north-wards to 61½° north lat.

Vicia tetrasperma (L.) Moench, Method. Pl. (1794) p. 148; Крыл. Фл. Алт. II (1903) p. 336. *Ervum tetraspermum* L. Spec. Pl. ed. II (1763) p. 1039; Ledeb. Fl. Alt. III, p. 352; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 278; Ledeb. Fl. Ross. I, p. 663.

Pretty common in the tracts along the river Abakan, on the islets, in thickets and meadows, where I have collected it in flower and with young pods in the second half of June. All of the specimens are nearly completely glabrous; the pods are glabrate, with 4, rarely 3, seeds, *f. leiocarpum* Gren. u. Godr. Fl. France (1848) p. 474. The stem is slender and relaxed; the flower comparatively small, only 5 mm. long, single.

Distribution: Europe, except the extreme north, southern Siberia, eastwards to the government of Yeniseisk, the Caucasus and south-western Asia to the north-western Himalayas, Corea, Japan, North Africa.

Vicia unijuga A. Br. Ind. Sem. Hort. Berol. 1853, App. 12. *Orobus lathyroides* L. Spec. Pl. ed. II (1763) p. 1027; Ledeb. Fl. Alt. III, p. 356; Turczan. Cat. Baical. no. 383; Ledeb. Fl. Ross. I, p. 688; Turczan. Fl. Baical.-Dahur. (1842) p. 795, no. 373; Крыл. Фл. Алт. II (1903) p. 341.

In dry places in meadows and thickets on the Lower Abakan, and in woods of coniferous and foliferous trees near Tagarski osero, south of Minusinsk. Collected in full flower at the beginning of July.

Distribution: Through south-eastern Siberia, from the eastern part of the Altai, northwards to about 58° north lat., Manchooria, Corea, China, northern Japan, Sakhalin.

Vicia sativa L. Spec. Pl. ed. II (1763) p. 1037; Ledeb. Fl. Ross. I, p. 665.

As a weed in fields by the road between Minusinsk and Kushabar.

Distribution: Europe, south-western Asia, Siberia, North Africa, North America.

Pisum sativum L. Spec. Pl. ed. II (1763) p. 1026; Ledeb. Fl. Ross. I, p. 660.

As a weed scattered in the cultivated districts between Minusinsk and Kushabar.

Distribution: Europe, south-western Asia, Siberia, the Himalayas, North Africa.

Lathyrus humilis Fischer in DC. Prodrom. II, p. 378 (sub *«Orobus»)*; Turczan. Cat. Baical. no. 382; Turczan. Fl. Baical.-Dahur. (1842) p. 793, no. 371; Крыл. Фл. Алт. II (1903) p. 337. *Lathyrus altaicus* Ledeb. Fl. Alt. III, p. 355; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 282. *L. altaicus β humilis* Ledeb. Fl. Ross. I, p. 682.

In shady woods of foliferous trees on the Upper Sisti-kem. In part done flowering at the end of July.

Distribution: Eastern Russia, southern Siberia, northwards to about 62½° north lat., northern Mongolia, Manchooria, the western Himalayas?

Lathyrus tuberosus L. Spec. Pl. ed. II (1763) p. 1033; Ledeb. Fl. Alt. III, p. 353; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 281; Ledeb. Fl. Ross. I, p. 682; Крыл. Фл. Алт. II (1903) p. 338.

Rather common on islets in the Lower Abakan, especially in meadows and open brush-woods, etc. Collected flowering at the end of June.

Distribution: Europe, northwards to southern Scandinavia (introduced), southwards to middle Italy, south-western Asia, southern Siberia, eastwards to the government of Yeniseisk, North Africa.

Lathyrus pratensis L. Spec. Pl. ed. II (1763) p. 1033; Ledeb. Fl. Alt. III, p. 353; Turczan. Cat. Baical. no. 380; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 279; Ledeb. Fl. Ross. I, p. 683; Turczan. Fl. Baical.-Dahur. (1842) p. 792, no. 369; Крыл. Фл. Алт. II (1903) p. 338.

The material collected shows that the species is subjected to great variations. The leaflets are generally narrowly lanceolate, broadest in the middle, and tapering towards the ends, 3—4 times as long as broad. The stipules are generally somewhat shorter than the petiole, to only one half of its length. The petals are sometimes of a greenish tinge. Scattered on hills and in meadows on islets in the rivers Yenisei and Abakan, at Kushabar, in the taiga territory on the Amyl, near Ust Algiac, Ust Sisti-kem, the Kamsara, and at Tapsa. The species begins flowering about the middle of June.

Distribution: Europe, Caucasia and south-western Asia to the Himalayas and Cashmere, Siberia, northwards to the Arctic Circle, and eastwards to Trans Baical, northern Mongolia, Japan?

Lathyrus pisiformis L. Spec. Pl. ed. II (1763) p. 1034; Ledeb. Fl. Alt. III, p. 354; Ledeb. Fl. Ross. I, p. 685; Turczan. Fl. Baical.-Dahur. (1842) p. 794, no. 372; Крыл. Фл. Алт. II (1903) p. 339.

In mixed woods of foliferous and coniferous trees about Ust Sisti-kem, and on the Dora Steppe. Flowering and in part done flowering in the first half of August.

Distribution: Eastern portions of middle Europe, south-western Asia, Siberia, northwards to about 61½° north lat., and eastwards roughly to the government of Irkutsk, northern Mongolia.

Lathyrus palustris L. Spec. Pl. ed. II (1763) p. 1034; Ledeb. Fl. Alt. III, p. 355; Turczan. Cat. Baical. no. 381; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 280; Ledeb. Fl. Ross. I, p. 686; Turczan. Fl. Baical.-Dahur. (1842) p. 793, no. 370; Крыл. Фл. Алт. II (1903) p. 340.

The species is very common in moist meadows and in thickets about the rivers Yenisei and Abakan, and also on the islets, and begins flowering here about the middle of June. It also occurs in the Urjankai country, near Ust Sisti-kem, and Ust Tara-kem, in shady thickets.

In contradistinction from Ascherson et Graebner (Synops. VI, 2 (1910) p. 1034), maintaining that this species is rather little variable, it seemed — at any rate to judge from my Asiatic material — to vary rather considerably. Thus, the rich material of this species collected by me in southern Siberia and the Urjankai country, varies considerably, especially in the number, length and breadth of the leaflets, and also in the density of the pubescence. All of the specimens collected are more or less puberulent; completely glabrate specimens do not occur in my collections. Even in specimens which at first sight seemed to be quite glabrous, the short stalks of the leaflets, the main veins beneath, and frequently also the youngest parts of the plants, at least, proved to be pubescent. The calyx-teeth are likewise always distinctly ciliate, while the calyx, for the rest, may be frequently completely glabrous. The most common form seemed to have the stem, the peduncles and the under sides of the leaves hairy, the upper sides of the leaves being glabrous or only pubescent along the main veins. There are to be found all transitions between nearly completely glabrate forms and specimens which are densely pubescent. Such a form, especially much puberulent all over the plant, in which the calyx is also much and distinctly puberulent, has been collected by me at Ust Kamuishto. A much hairy form of this kind has been described by Ledebour, Fl. Ross. I, p. 686, under the name of *f. pilosus*, to which the said specimens must probably be referred. Any difference in the size of these specimens or in the size of the stipules, as described by Ledebour in *f. pilosus*, I have not been able to point out in my material. The stipules seemed, as a rule, in their size and shape, to be dependent on the leaflets; specimens with large leaflets have mostly large stipules too, and vice-versa, specimens with broad leaflets have broad stipules, while the small-leaved specimens are characteristic in having narrow, small, and acuminate stipules.

In thickets near Askys I have collected a form with very broad leaflets, to 14 mm. broad, and 3—4 times as long. The leaves are 2—3 pinnate, with broad stipules, f. *latifolius* Lambertye, Cat. Pl. Marne (1846) p. 53. Is likely only to be considered as a modification due to the habitat, viz. a shade-loving form. On the islets in the Yenisei, between Minusinsk and Ust Abakansk, there occur specimens with very narrow and long leaflets. The breadth of the leaflets varies between 2 and 4 mm. and the length is 15—20 times the breadth. The leaves, which have long, narrow, mucronulate stipules, are 4—5 pinnate, *f. linearifolius* Ser. in DC. Prodom. II (1825) p. 371. The specimens of the latter, mentioned by Komarow from eastern Asia (Фл. Маньчжурии 2, II (1904) p. 628), where it is very common, have only 1—3 pinnate leaves, by which character they

differ distinctly from my specimens. It seemed upon the whole, in this species, as in the genus *Vicia*, that forms with broad leaflets mostly have less pinnae than leaves characterized by narrow pinnae.

Distribution: Europe, southwards to middle Italy, the Caucasus, Siberia, northern Mongolia, eastern Asia, Sakhalin, Japan, North America.

Lathyrus Gmelini Fritsch in Sitzber. Akad. Wiss. Wien. Math.—Naturw. Cl. CIV (1895) p. 479. *Orobus luteus* L., Ledeb. Fl. Alt. III, p. 361; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 283. *Orobus luteus β orientalis* Fisch. et Mey., Ledeb. Fl. Ross. I, p. 690; Крыл. Фл. Алт. II (1903) p. 343.

In subalpine wooded tracts about the Upper Amyl, and in the Altaian, on the Upper Sisti-kem, in mixed wood of coniferous and foliferous trees. In part done flowering and with nearly ripe fruits at the end of July.

Distribution: Siberia, from the Ural to Trans Baikal, and northwards to about 58° north lat., northern Mongolia, Turkestan, the western Himalayas.

Orobus alpestris Waldst. et Kit. Pl. Rar. Hungar. (1803—12) II, p. 133; Ledeb. Fl. Alt. III, p. 358; Ledeb. Fl. Ross. I, p. 689; Крыл. Фл. Алт. II (1903) p. 342.

On slopes on the Upper Sisti-kem. Past flowering in the second half of July.

Distribution: Southern Siberia (the Altai and Sayansk districts), northern Mongolia.

Hedysarum obscurum L. Syst. Nat. ed. X (1759) p. 1171; Федченко, Обзоръ Рода *Hedysar.* 49 in Act. Hort. Petropol. XIX, p. 231; Ledeb. Fl. Alt. III, p. 341; Ledeb. Fl. Ross. I, p. 706; Basiner, Monogr. *Hedysar.* no. 5; Крыл. Фл. Алт. II (1903) p. 347. *H. consanguineum* Bunge, Enum. Alt. p. 73. *H. inundatum* Turczan. Cat. Baical. no. 366; Turczan. Fl. Baical.-Dahur. (1842) p. 781, no. 356.

var. **lasiocarpum** (Ledeb.) Fedtsch. l. c.

In the Altaian, on the banks of the Upper Sisti-kem, in alpine meadows.

Distribution: Arctic and alpine regions of Europe, Caucasia, Trans Caucasia, Russian Turkestan, Siberia, northern Mongolia, Sakhalin, North America.

Hedysarum polymorphum Ledeb. Fl. Alt. III, p. 338; Ledeb. Fl. Ross. I, p. 701; Basiner, Monogr. *Hedysar.* no. 26; Крыл. Фл. Алт. II (1903) p. 346.

On dry, open steppe, and on rocky slopes at Ust Tara-kem; almost past flowering in the second half of august.

Distribution: South-eastern Russia, Russian Turkestan, southern Siberia, northwards to about 56° north lat., and eastwards to Trans Baikal, northern Mongolia.

Onobrychis viciaefolia Scopoli, Fl. Carniolica ed. II, 2 (1772) p. 76. *O. sativa* Lam. Fl. France II (1778) p. 652; Ledeb. Fl. Ross. I, p. 708; Turczan. Fl. Baical.-Dahur. (1842) p. 783, no. 358; Крыл. Фл. Алт. II (1903) p. 349. *O. arenaria* Ledeb. Fl. Alt. III, p. 342. *O. carpatica* Turczan. Cat. Baical. no. 369.

Very common in meadows and in open brush-wood on islets in the Lower Abakan, on the Bei-kem, near the Dora Steppe, and on flood-plains near Ust Tara-kem. In full flower at the end of June, past flowering and with ripe pods in the second half of August.

Distribution: Middle and southern Europe, south-western Asia, southern Siberia, northwards to about 56° north lat., and eastwards roughly to Trans Baikal, northern Mongolia, North Africa.

Geraniaceae St. Hilaire.

Geranium sibiricum L. Spec. Pl. ed. II (1763) p. 957; Knuth, *Geraniaceae* in Engl. Pflanzenr. H. 53 (IV, 129, 1912) p. 195; Ledeb. Fl. Alt. III, p. 227; Turczan. Cat. Baical. no. 276; Ledeb. Fl. Ross. I, p. 459; Turczan. Fl. Baical.-Dahur. (1842) p. 624, no. 265; Крыл. Фл. Алт. I (1901) p. 193.

Found in flower in the second half of June, in moist, grass-grown places on islets in the river Abakan, near Ust Kamuishto. Near Kushabar, at the beginning of July, I have collected some specimens of this one, with very low, decumbent, or trailing stems, only 3—8 cm. long, with spreading branches and petioles, and smaller, sometimes only 3-parted leaves. For the rest, they agree perfectly with the typical plant, and I consider them only to be reduced starved forms. The species also occurs in meadows, near Ust Kamsara, where collected by me in fruit in the middle of August.

Distribution: Middle and southern Russia (occurring also strayed in middle Europe), the Caucasus, Turkestan, Tibet, the Himalayas, Siberia, Mongolia, eastern Asia, Japan, North America (introduced).

Geranium albiflorum Ledeb. Fl. Alt. III, p. 230; Knuth, *Geraniaceae* in Engl. Pflanzenr. H. 53 (IV, 129, 1912) p. 124; Turczan. Cat. Baical. no. 282; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 194; Ledeb. Fl. Ross. I, p. 463; Turczan. Fl. Baical.-Dahur. (1842) p. 630, no. 271; Крыл. Фл. Алт. I (1901) p. 194.

In open coniferous forest in the Amyl taiga, and on slopes, etc., near Ust Algic. With flowers in the second half of July.

Distribution: Eastwards from the Thian-Shan, through Siberia and northern Mongolia, roughly to Trans Baikal.

Geranium pratense L. Spec. Pl. ed. II (1763) p. 954; Knuth, *Geraniaceae* in Engl. Pflanzenr. H. 53 (IV, 129, 1912) p. 127; Ledeb. Fl. Alt. III, p. 229; Turczan. Cat. Baical. no. 279; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 191; Ledeb. Fl. Ross. I, p. 466; Turczan. Fl. Baical.-Dahur. (1842) p. 627, no. 268; Крыл. Фл. Алт. I (1901) p. 195.

Scattered in meadows and in thickets on islets in the Lower Abakan, and on slopes about Ust Sisti-kem, where collected in flower and with half ripe fruits in June—August. The stems are rather densely pubescent, with spreading or retrorse, rather coarse hairs, their upper parts and also the peduncles and sepals, glandulous, with dense purple- or violet-tipped glandular hairs.

Distribution: Europe, Turkestan, eastwards to Tibet and the Himalayas, Siberia and Mongolia, eastwards to the Khingan mountains, Kamtchatka, China, Corea, Japan, North America (introduced).

Geranium silvaticum L. Spec. Pl. ed. II (1763) p. 954; Knuth, *Geraniaceae* in Engl. Pflanzenr. H. 53 (VI, 129, 1912) p. 119; Ledeb. Fl. Ross. I, p. 465; Крыл. Фл. Алт. I (1901) p. 194.

Scattered in the taiga territory about the rivers Amyl and Sisti-kem, flowering in July. Besides the typical plant I have here also met with specimens the petals of which scarcely exceed the sepals, *f. parviflorum* A. Bl.

Distribution: Europe, Caucasia, Siberia, eastwards to about the Yenisei (the Baikal district?), introduced into North America.

Geranium pseudosibiricum I. Meyer in Bøhm. Abhandl. (1786) p. 238; Knuth, *Geraniaceae* in Engl. Pflanzenr. H. 53 (IV, 129, 1912) p. 124; Ledeb. Fl. Ross. I, p. 469; Крыл. Фл. Алт. I (1901) p. 196. *G. laetum* Ledeb. Fl. Alt. III, p. 228; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 190. *G. bifolium* Petr. apud Bunge, Enum. Alt. p. 62; Turczan. Fl. Baical.-Dahur. (1842) p. 628, no. 269. *G. coeruleum* Turczan. Cat. Baical. no. 281.

Pretty common in the territory traversed, especially in the subalpine wooded tracts about the Upper Amyl and the Sisti-kem, where I have collected it flowering and with incipient fruit formation in the middle of July. At Kalna I have collected a form with very small petals, only about 3,5—4 mm. long, scarcely exceeding the sepals. For the rest, it agrees with the typical form. About Ust Tara-kem the species occurs on flood-plains, in woods of larch intermingled with various foliage trees.

Distribution: Eastern Russia, through the greater part of Siberia, northern Mongolia.

Geranium Robertianum L. Spec. Pl. ed. II (1763) p. 955; Knuth, *Geraniaceae* in Engl. Pflanzenr. H. 53 (IV, 129, 1912) p. 64; Ledeb. Fl. Alt. III, p. 233; Ledeb. Fl. Ross. I, p. 473; Крыл. Фл. Алт. I (1901) p. 198.

In cracks and crevices on sloping cliffs, near Ust Algiac, in full flower in July.

Distribution: Europe, temperate Asia, North Africa, North and South America.

Erodium cicutarium (L.) L'Herit. ex Ait. Hort. Kew. ed. I, 2 (1789) p. 414; Knuth, *Geraniaceae* in Engl. Pflanzenr. H. 53 (IV, 129, 1912) p. 274; Ledeb. Fl. Ross. I, p. 476; Крыл. Фл. Алт. I (1901) p. 199.

At Kushabar, along road-sides, and in dry, grass-grown places near the village, taken by me with flowers and fruits in the middle of July. All of the specimens are rather densely glandular-hairy above.

Distribution: Europe, Caucasia, south-western Asia to Tibet and the Himalayas, India, scattered through Siberia to Kamtchatka, North Africa, Abyssinia, America, Australia.

Erodium Stephanianum Willd. Spec. Pl. III (1800) p. 625; Knuth, *Geraniaceae* in Engl. Pflanzenr. H. 53 (IV, 129, 1912) p. 272; Ledeb. Fl. Alt. III, p. 221; Turczan. Cat. Baical. no. 283; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 196; Ledeb. Fl. Ross. I, p. 475; Turczan. Fl. Baical.-Dahur. (1842) p. 631, no. 272; Крыл. Фл. Алт. I (1901) p. 199.

Pretty common on islets in the Lower Abakan, and near habitations at Ust Sistikem. Collected with flowers and ripe fruits in June—August.

Distribution: The Caucasus, southern Siberia, eastwards to the Amoor region, Dzungaria, Tibet, northern Mongolia, Manchooria, Corea, China.

Balsaminaceae S. F. Gray.

Impatiens noli tangere L. Spec. Pl. ed. II (1763) p. 1329; Ledeb. Fl. Alt. I, p. 265; Turczan. Cat. Baical. no. 284; Ledeb. Fl. Ross. I, p. 481; Turczan. Fl. Baical.-Dahur. (1842) p. 632, no. 273; Крыл. Фл. Алт. I (1901) p. 200.

In thickets on a brooklet near Kushabar, and common along brook-sides and in moist shady places in the Amyl taiga, at Ust Algiac, Ust Sisti-kem, and at Ust Tara-kem. Flowering and with ripe fruits in July and at the beginning of August.

Distribution: Europe, the Caucasus, Asia Minor, through Siberia right up to the Sea of Okhotsk, northern Mongolia, eastern Asia, Sakhalin, Japan.

Oxalidaceae Lindl.

Oxalis Acetosella L. Spec. Pl. ed. II (1762) p. 620; Ledeb. Fl. Alt. II, p. 188; Turczan. Cat. Baical. no. 284; Ledeb. Fl. Ross. I, p. 482; Turczan. Fl. Baical.-Dahur. (1842) p. 633, no. 274; Крыл. Фл. Алт. I (1901) p. 201.

Only rather rare in the subalpine coniferous forests about the Upper Amyl. Flowering and past flowering in the middle of July.

Distribution: Europe, Caucasia, the Himalayas, Siberia, eastern Asia, Sakhalin, Japan, North Africa, North America.

Zygophyllaceae Lindl.

Tribulus terrestris L. Spec. Pl. ed. II (1762) p. 544; Ledeb. Fl. Alt. II, p. 107; Turczan. Cat. Baical. no. 286; Ledeb. Fl. Ross. I, p. 486 et 786; Turczan. Fl. Baical.-Dahur. (1842) p. 635, no. 275; Крыл. Фл. Алт. I (1901) p. 204.

In dry, sandy places near Ust Tapsa, where it is of very common occurrence near habitations. Collected with ripe fruits at the end of August.

Distribution: Southern Europe, Caucasia, and south-western Asia to Tibet and India, Ceylon, south-western Siberia, northern China, Mongolia, Japan, Arabia, North and South Africa, Australia, America, adventive from Europe.

Linaceae DUMORT.

Linum perenne L. Spec. Pl. ed. II (1762) p. 397; Ledeb. Fl. Ross. I, p. 426. *L. sibiricum* DC., Ledeb. Fl. Alt. I, p. 440; Turczan. Cat. Baical. no. 272; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 180; Turczan. Fl. Baical.-Dahur. (1842) p. 617, no. 261; Крыл. Фл. Алт. I (1901) p. 182.

Scattered in the steppe area about the river Abakan, and between Minusinsk and Kushabar, where chiefly occurring in dry meadows, on rocks, etc. The species varies considerably according to the nature of the habitat. On dry, sandy steppes, and on dry, sunny rocks, as for instance on the Abakan Steppe, it is of a lower growth, on an average 15—20 cm. high, rarely up to 30 cm. high, simple or only slightly ramified in the upper part, with numerous, dense, appressed-ascending, filiform, one-nerved leaves, the margins of which are distinctly revolute, or even nearly inrolled. The pedicels are comparatively short, the sepals equal, subobtuse, or only with a minute point at the summit, without distinct ribs. The whole plant is completely glabrous, of a dull, glaucous colour. This form seemed to be nearly allied to *f. bavaricum* (SCHULTZ) ASCHERS. et GRAEBN. Synops. VII (1914) p. 203.

In moister places, on the contrary, it attains a greater height, and is more flowery; the leaves are more distant and broader, and often considerably longer, to 2 cm. long, nearly lanceolate, generally 3-nerved; the sepals, at least in their lower parts, with 3 or 5 distinct ribs, and frequently distinctly acuminate at the apex, *f. latifolium* R. BEYER, Verh. B. V. Brandenb. XCIV (1899).

All intermediate forms, however, are to be found between these, according to the conditions of the soil. The species begins flowering in the second half of June. Withering remains of this species have also been found by me on the steppes on the Ulu-kem, at the beginning of September.

Distribution: Southern Europe, the Caucasus and south-western Asia to Tibet and the Himalayas, India, Siberia (also in the arctic parts), northern Mongolia, Japan. The species has also been reported from North America, which, however, is probably due to a mistake of identity with the nearly allied *L. Lewisii* PURSCH.

Polygalactaceae JUSS.

Polygala sibiricum L. Spec. Pl. ed. II (1763) p. 987; Ledeb. Fl. Alt. III, p. 248; Turczan. Cat. Baical. no. 211; Ledeb. Fl. Ross. I, p. 269; Turczan. Fl. Baical.-Dahur. (1842) p. 312, no. 199; Regel, Pl. Radd. (1861) p. 517; Chodat, Monogr. *Polygala* in Mem. Soc. Phys. Geneve XXXI, 2 (1893) p. 347; Крыл. Фл. Алт. I (1901) p. 130.

Of rather common occurrence in the tracts about the Lower Abakan, especially in dry meadows, on rocks, etc., where it begins flowering in the middle of June. The specimens collected belong to *f. latifolia* LEDEB.

Distribution: Siebenbürgen, middle and southern Russia, the Caucasus, Afghanistan, the Himalayas, southern Siberia, northern Mongolia, eastern Asia, Japan.

Polygala comosum Schkuhr, Bot. Handb. II (1796) p. 324; Ledeb. Fl. Alt. III, p. 247; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 134; Turczan. Fl. Baical.-Dahur. (1842) p. 313, no. 201; Ledeb. Fl. Ross. I, p. 271. *P. vulgaris* subspec. *comosa* Chodat, Monogr. *Polygala* (1893) p. 453. *P. vulgaris β comosa* Herder, Pl. Radd. (1861) p. 514; Крым. Фл. Алт. I (1901) p. 131. *P. hybrida* Turczan. Cat. Baical. no. 212. [Tab. X, Fig. 1].

This exceedingly polymorphous species is abundant in the Minusinsk district, where I have collected a rather rich material, which did not seem to be quite indentical with any of the numerous forms and varieties described from Europe. My material, originating form various localities in southern Siberia, however, seemed to be quite homogeneous.

The specimens brought home seemed, in various respects, to constitute distinct intermediates to *P. Nicaeense* Risso. The stems are numerous, high and vigorous, to 35 cm. high, ascending at the base, frequently a little lignified, finely puberulent, generally simple or emitting small branches above, each of them terminating in a few-flowered raceme. The lower leaves are comparatively short and broad, ovate-spatulate, the upper ones lanceolate, 2—4 cm. long, and 2—4 mm. broad, glabrate or slightly ciliate. The stems are leaved right up to the flower cluster. The raceme is flowery, densely flowered and pyramidical when young, later on somewhat prolonged and more loosely flowered, during the flowering commonly 5—7 cm. long, later on increasing to 10—12 cm. in length, and containing, on an average, 30—35 flowers. The pedicels are short, 1,5—2 mm. long, slightly wing-angled. The middle bracteole is 3,5—4 mm. long, bluish, about twice as long as the pedicel, broadly lanceolate, later on clapped together in a boat's shape. The 2 lateral bracteoles are shorter, of about the same length as the pedicel, colourless, membranous. The bracteoles are caducous early in season. The flowers are very large, considerably larger than in the typical plant. The 3 outer sepals are 3—4 mm. long, ⅓—½ of the length of the wings, broadly lanceolate, of a bluish green colour, and sparingly ciliate. The wings are finely ciliate, large, 7—9 mm. long, and about 5 mm. broad, ovate, obtuse or subacutish at the apex, and furnished with 1 greenish, rather coarse, generally unbranched middle vein, and 2 fainter lateral veins, the ramifications of which are not reticularly connected, or only slightly so. The wings are of a bluish-violet, gradually fading to greenish yellow. The corolla, of a much darker colour than the wings, generally protrudes a little beyond the latter. The fruit is very shortly stalked, cuneately tapering below, and cordately incised above, narrowly winged at the margin. The present plant seemed in various respects to constitute transition between *Polygala comosum* and *Polygala Nicaeense*. The rich, rather densely flowered raceme, distinctly tufted when young, recalls the former, while the large flowers and the shape of the wings are most suggestive of *Polygala Nicaeense*. The above form is of rather common occurrence in the tracts about the Lower Abakan, where I have collected it in several places on the steppes between Minusinsk and Ust Abakansk, in dry, grass-grown localities, in thicket of *Caragana arborescens*, together with plants such as *Solidago Virgaurea, Fragaria viridis, Iris ruthenica, Stellaria graminea*, and the like. Flowering and with fruits in the first half of June.

Distribution: Middle Europe, southwards to northern Italy and the north of the Balkan Peninsula, northwards in Finland and Sweden, the Caucasus, Siberia, eastwards to Trans Baikal.

Euphorbiaceae St. Hilaire.

Euphorbia altaica C. A. Meyer in Ledeb. Fl. Alt. IV, p. 190; Ledeb. Fl. Ross. III, p. 565; Крыл. Фл. Алт. V (1909) p. 1189.

In the Altaian, on the Upper Sisti-kem, in alpine meadows about the limit of tree vegetation, where rather common. Collected with young fruits at the end of July.

Distribution: Russian Turkestan, the Altai and Sayansk districts.

Euphorbia alpina C. A. Meyer in Ledeb. Fl. Alt. IV, p. 186; Bunge, Enum. Alt. p. 81; Turczan. Cat. Baical. no. 1003; Ledeb. Fl. Ross. III, p. 561; Turczan. Fl. Baical.-Dahur. (1854) p. 357, no. 1005; Regel, Pl. Radd. (1892) p. 353, no. 113; Крыл. Фл. Алт. V (1909) p. 1187.

On stony, grass-grown slopes in the subalpine taiga territory about the Upper Amyl and the Upper Algiac, near the limit of tree vegetation. In full flower about the middle of July.

Distribution: Southern Siberia, from the government of Tomsk eastwards to about Irkutsk and Trans Baikal, where occurring rather sparingly.

Euphorbia lutescens C. A. Meyer in Ledeb. Fl. Alt. IV, p. 194; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 814; Ledeb. Fl. Ross. III, p. 568; Herder, Pl. Radd. (1892) p. 354, no. 116 et 468; Крыл. Фл. Алт. V (1909) p. 1190.

On the Bei-kem, near Ust Sisti-Kem, and at Utinski porog, in moist meadows and thickets; in the Altaian, on the Upper Sisti-kem, it ascends right up to above the tree limit, where found by me in abundance, with ripe fruits in July.

Distribution: Southern Siberia (southern parts of the governments of Tomsk and Yeniseisk, northwards to 61° north lat.), northern Mongolia.

Euphorbia Esula L. Spec. Pl. ed. II (1762) p. 660; Ledeb. Fl. Alt. IV, p. 181; Turczan. Cat. Baical. no. 1005; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 807; Ledeb. Fl. Ross. III, p. 575; Turczan. Fl. Baical.-Dahur. (1854) p. 359, no. 1007; Herder, Pl. Radd. (1892) p. 354, no. 118 et p. 367, 468; Крыл. Фл. Алт. V (1909) p. 1192.

Very common on the Abakan Steppe, in dry, grass-grown places, in gravelly and sandy localities, near cultivated fields, etc., where I have collected it with flowers in the middle of June. The specimens collected partly belong to *f. genuina* Boiss. (in DC. Prodrom XV, p. 160), partly to *f. cyparissioides* Boiss. (l. c. p. 161. *E. caesia* Karel. et Kiril. Enum. Pl. Fl. Alt. p. 743. *E. Cyparissias β pubescens* Ledeb. Fl. Alt. IV, p. 180. *E. Cyparissias* L. Turczan. l. c. p. 359, no. 1008; Herder, Pl. Radd. (1892) p. 359, no. 122). I have also found the species near habitations at Ust Kamsara, with fruits in August.

Distribution: Greater part of Europe, the Caucasus and south-western Asia, southern Siberia (in the Yenisei valley northwards to 62° north lat., in eastern Siberia northwards right up to 70½° north lat.), northern Mongolia, eastern Asia, Japan.

Callitrichaceae LINDL.

Callitriche verna L. Spec. Pl. ed. II (1762) p. 6; Turczan. Fl. Baical.-Dahur. (1844) p. 230, no. 450; Hegelmaier, Monogr. in Verh.. Bot. Ver. Brandenburg IX (1867) p. 1; ibid. X (1868) p. 100. *C. vernalis* Kütz. in Reichenb. Ic. Crit. p. 175; Ledeb. Fl. Ross. II, p. 121. *C. verna* L. *β vernalis* Kütz., Крыл. Фл. Алт. II (1903) p. 441.

Common in small ponds etc., on islets in the Yenisei, near Ust Abakansk, in pools and stagnant water between Minusinsk and Kushabar, on the Tara-kem, near Kokus, and in swamps on the Dora Steppe. Collected with young fruits at the beginning of June.

Distribution: Europe, Siberia, northern Mongolia, Turkestan, the East Indies, China, Japan, North Africa, North America, Greenland, Australia.

Empetraceae LINDL.

Empetrum nigrum L. Spec. Pl. ed. II (1763) p. 1450; Ledeb. Fl. Alt. IV, p. 292; Turczan. Cat. Baical. no. 762; Ledeb. Fl. Ross. III, p. 555; Turczan. Fl. Baical.-Dahur. (1854) p. 354, no. 1003; Herder, Pl. Radd. (1892) p. 349, no. 111 et p. 366; Крыл. Фл. Алт. V (1909) p. 1182.

Common in the taiga territory on the Upper Amyl and in the Altaian, right up to the perennial snow, in places grown with mosses and lichens. Specimens collected at the end of July, are past flowering, bearing half ripe fruits.

Distribution: Europe, in the southern parts only on the mountains, the Caucasus, Asia Minor, Siberia, northwards to 71° 20′ in the Yenisei valley, northern Mongolia, Kamtchatka, Sakhalin, Japan, Greenland, North America.

Malvaceae NECK.

Malva borealis Wallmann in Liljebl. Sv. Fl. ed. 3; Ledeb. Fl. Alt. III, p. 234; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 181; Ledeb. Fl. Ross. I, p. 436; Крыл. Фл. Алт. I (1901) p. 186.

Pretty common in waste places, along road-sides, and as a weed about Karatus and Kushabar, where I have found it in flower and with ripe fruits in the first half of July.

Distribution: Europe, Caucasia, Siberia, eastwards to about the Yenisei, Turkestan, the Himalayas, India.

Rhamnaceae DUMORT.

Rhamnus Frangula L. Spec. Pl. ed. II (1762) p. 280; Ledeb. Fl. Alt. I, p. 252; Ledeb. Fl. Ross. I, p. 503; Крыл. Фл. Алт. I (1901) p. 207.

Scattered in the Amyl taiga, where especially occurring in thickets and in slightly moist places.

Distribution: Europe, the Caucasus, Asia Minor and south-western Asia, Siberia, eastwards roughly to the Yenisei.

Hypericaceae LINDL.

Hypericum Ascyron L. Spec. Pl. ed. II (1763) p. 1102; Maxim. in Mel. Biol. XI, p. 162; Ledeb. Fl. Alt. III, p. 363; Turczan. Cat. Baical. no. 274; Ledeb. Fl. Ross. I, p. 446; Turczan. Fl. Baical.-Dahur. (1842) p. 621, no. 263; Крыл. Фл. Алт. I (1901) p. 188.

The specimens collected belong to the typical plant, with long petals, 3—3,5 cm. long, and with short sepals, only about 1 cm. long. The plants are generally 3-flowered. Number of styles generally 5, rarely only 4.

Scattered near Kushabar, in open copse wood of foliage trees, mostly in slightly humid places. Specimens collected about the middle of July in flower, and in part done flowering.

Distribution: Siberia, from the governments of Tomsk and Semipalatinsk to Kamtchatka, Manchooria, Corea, northern China, south-eastern Mongolia, Japan, North America.

Hypericum perforatum L. Spec. Pl. ed. II (1763) p. 1104; Ledeb. Fl. Alt. III, p. 364; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 185; Ledeb. Fl. Ross. I, p. 447; Крыл. Фл. Алт. I (1901) p. 189.

In dry thickets, on hills and slopes near Karatus and Kushabar. In flower and partly done flowering in the first half of July. Collected with fruits in the middle of August, on dry hills near Ust Sisti-kem, and at Ust Kamsara.

Distribution: Europe, Caucasia, western and middle parts of Siberia, south-western Asia to the western Himalayas, northern Mongolia, western China, North Africa, North America (introduced).

Hypericum hirsutum L. Spec. Pl. ed. II (1763) p. 1105; Ledeb. Fl. Alt. III, p. 365; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 186; Ledeb. Fl. Ross. I, p. 449; Крыл. Фл. Алт. I (1901) p. 189.

I open brush-wood, on declivities, and the like, in the wooded steppe region about Karatus and Kushabar, scattered on sunny, dry, southern slopes in the Amyl taiga, at Ust Sisti-kem and Ust Kamsara. In full flower in July, partly with fruits in August.

Distribution: Europe, the Caucasus, Siberia, eastwards to about the Yenisei, Russian Turkestan, north-western Mongolia.

Hypericum elegans Stephan apud Willd. Spec. Pl. III, p. 1469; Ledeb. Fl. Alt. III, p. 368; Ledeb. Fl. Ross. I, p. 450; Крыл. Фл. Алт. I (1901) p. 190.

On stony declivities and in groves south of Minusinsk. In full flower in the early days of July.

Distribution: Middle and south-eastern Europe, south-western Siberia, eastwards roughly to the Yenisei.

Tamaricaceae LINDL.

Myricaria davurica Ehrenb. in Linnaea II, p. 278; Ledeb. Fl. Alt. III, p. 224; Bunge, Enum. Alt. p. 59; Turczan. Cat. Baical. no. 465; Ledeb. Fl. Ross. II, p. 132; Turczan. Fl. Baical.-Dahur. (1844) p. 237, no. 456; Крыл. Фл. Алт. II (1903) p. 446.

On sandy and stony river-banks on the Yenisei, near Ust Abakansk, where forming shrubs of about a man's height. Collected by me in full flower at the beginning of June. On the Ulu-kem, near Bjelosarsk, done flowering at the end of August.

Distribution: Through southern Siberia from the Thian-Shan, through the Altai and Sayansk regions to Trans Baikal, northern Mongolia.

Violaceae DC.

Viola Komarovii Becker, *Violae* Asiat. et Austral. in Beih. Bot. Centralbl. XXXIV H. 2 (1916) p. 237. *V. silvestris* Ledeb. Fl. Ross. I, p. 253 p. p. (quoad pl. altaic., baical. et kamtschat.). *V. canina β sylvestris* Regel, Pl. Radd. (1861) p. 490, no. 261 p. p.

Large and well-grown specimens have been collected by me in the subalpine regions about the Upper Amyl and at Ust Algiac. The height of the specimens is about 20 cm. The leaves are always cordately incised at the base, their breadth from 2 to 3,5 cm., their length from 2,5 to 4 cm., the apex rather obtuse, the margin slightly crenate. The stipules are comparatively large, to 18 mm. long, and 8 mm. broad, the margin always rather deeply and argute serrate. The plant is completely glabrous, or the stipules and the leaves may be finely ciliate. Taken with ripe fruits in the middle of July.

Distribution: Siberia, from about the Upper Ob to Kamtchatka and the Amoor Province, the Sayansk district, Sakhalin, Japan.

Viola mirabilis L. Spec. Pl. ed. II (1763) p. 1326; Ledeb. Fl. Alt. I, p. 259; Turczan. Cat. Baical. no. 199; Ledeb. Fl. Ross. I, p. 250; Turczan. Fl. Baical.-Dahur. (1842) p. 303, no. 188; Regel, Pl. Radd. (1861) p. 481, no. 260, excl. var. *Langsdorffii;* Крыл. Фл. Алт. I (1901) p. 123; Беккеръ, Фіалковыя въ Федченко, Фл. Азіат. Россіи 8 (1915) p. 28.

var. **subglabra** Ledeb. Fl. Ross. I, p. 251; Беккеръ, l. c.

In rather dry thickets of foliferous trees, near Karatus. Past flowering in the first half of July.

Distribution: Northern and middle Europe, Caucasia, through Siberia, northwards to about 55° north lat., Manchooria, Japan.

Viola rupestris Schmidt, Neue Abhdb. Bøhm. Gesellsch. I (1791) p. 60.

var. **arenaria** (DC.) Beck, Fl. Nied.-Oest. (1890) p. 519; Беккеръ, Фіалковыя въ Федченко, Фл. Азіат. Россіи 8 (1915) p. 35. *V. arenaria* DC. Fl. France IV (1805) p. 806; Ledeb. Fl. Alt. I, p. 260; Turczan. Cat. Baical. no. 201; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 127; Turczan. Fl. Baical.-Dahur. (1842) p. 304, no. 189; Крыл. Фл. Алт. I (1901) p. 125. *V. canina δ rupestris* Regel, Pl. Radd. (1861) p. 495.

In dry, sunny places in the Amyl taiga, and in dry, sandy woods of larch and pine at Ust Sisti-kem. In flower and partly done flowering in July and August.

Distribution: Europe, Caucasia and south-western Asia to the Himalayas, throughout Siberia, northwards to about 63° north lat., and eastwards to Kamtchatka and the Amoor Province. In North America the nearly allied species *V. adunca* Sm. and *V. odontophora* Rydb.

Viola canina L. Spec. Pl. ed. II (1763) p. 1324; Ledeb. Fl. Alt. I, p. 260; Turczan. Cat. Baical. no. 200; Ledeb. Fl. Ross. I, p. 252, excl. var. *neglecta*; Turczan. Fl. Baical.-Dahur. (1842) p. 304, no. 190; Regel, Pl. Radd. (1861) p. 489, no. 261, excl. var. *sylvestris;* Крыл. Фл. Алт. I (1901) p. 125 (var. α et β); Беккеръ, Фіалковыя въ Федченко, Фл. Азіат. Россіи 8 (1915) p 45; Becker, *Violae* Asiat. et Austral. (1917) p. 384. *V. Ruppii* Ledeb. l. c. p. 491.

Between Minusinsk and Karatus, and near Kushabar, on dry hills overgrown with open copse wood. Flowering and in part done flowering in the first half of July.

Distribution: Europe, except the southern parts, Caucasia, Siberia, except the arctic regions, northwards to about 60° north lat., eastwards to Kamtchatka, eastern Asia, Sakhalin, Japan, North America, Greenland.

Viola pumila Chaix in Vill. Hist. Dauph. I (1786) p. 339, II (1787) p. 666; Беккеръ, Фіалковыя въ Федченко, Фл. Азіат. Россіи 8 (1915) p. 63; Becker, *Violae* Asiat. et Austral. (1917) p. 389. *V. montana* Ledeb. Fl. Alt. I, p. 261; Turczan. Cat. Baical. no. 202; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 128. *V. persicifolia* Turczan. Fl. Baical.-Dahur. (1842) p. 305, no. 191. *V. pratensis* Fries, Ledeb. Fl. Ross. I, p. 251; Крыл. Фл. Алт. I (1901) p. 124. *V. montana* var. *pratensis* Regel, Pl. Radd. (1861) p. 497, no. 262.

The Asiatic specimens are distinguished by a comparatively long spur, and by their broader and shorter leaves, frequently truncate at the base. In the material collected the leaves are 2½ times as long as broad. Of rather common occurrence on islets in the Yenisei, near Ust Abakansk, especially in somewhat humid, grass-grown places, and in moist, open copse wood at Kushabar, near the river. The species begins flowering already at the end of May and the beginning of June.

Distribution: Middle Europe, northwards to Sweden, and southwards to Serbia and Bulgaria, Turkestan, Siberia, eastwards to about Lake Baikal.

Viola epipsila Ledeb. Ind. Sem. Hort. Dorpat. (1820) p. 5; Turczan. Cat. Baical. no. 195; Ledeb. Fl. Ross. I, p. 247, excl. syn; Turczan. Fl. Baical.-Dahur. (1842) p. 302, no. 186; Regel, Pl. Radd. (1861) p. 478, no. 257; Крыл. Фл. Алт. I (1901) p. 122; Беккеръ, Фіалковыя въ Федченко, Фл. Азіат. Россіи 8 (1915) p. 57; Becker, *Violae* Asiat. et Austral. (1917) p. 405;

subspec. **repens** (Turczan.) Becker, l. c. (1915) p. 58. *V. repens* Turczan. in Bull. Soc. Nat. Moscou (1838) p. 88.

In moist and boggy places, rather frequent in the subalpine wood regions about the Upper Amyl and about the Upper Sisti-kem. Flowering and past flowering in July.

Distribution: The subspecies *repens* is distributed through Siberia, eastwards to Kamtchatka, and northwards to 67° north lat., Manchooria, Sakhalin, North America (Sitka Island).

Viola Patrinii DC. Prodrom. I (1824) p. 293; Turczan. Cat. Baical. no. 192; Ledeb. Fl. Ross. I, p. 245; Turczan. Fl. Baical.-Dahur. (1842) p. 299, no. 181; Regel, Pl. Radd. (1861) p. 475, no. 254; Беккеръ, Фіалковыя въ Федченко, Фл. Азіат. Россіи 8 (1915) p. 68.

Scattered in the taiga territory, in humid, grass-grown meadows; nearly past flowering and with fruits in the middle of July.

Distribution: Eastern Siberia, from about the Yenisei to the Amoor Province between 44° and 56° north lat., Manchooria, the Himalayas, China, Japan.

Viola biflora L. Spec. Pl. ed. II (1763) p. 1326; Ledeb. Fl. Alt. I, p. 261; Turczan. Cat. Baical. no. 203; Ledeb. Fl. Ross. I, p. 254; Turczan. Fl. Baical.-Dahur. (1842) p. 306, no. 192; Крыл. Фл. Алт. I (1901) p. 126; Беккеръ, Фіалковыя въ Федченко, Фл. Азіат. Россіи 8 (1915) p. 89. *V. biflora α typica* Regel, Pl. Radd. (1861) p. 498, no. 263.

Rather common in the subalpine wood regions on the Upper Amyl, especially in somewhat moist places, and in the Altaian, at altitudes of about 2000 m. above sea-level, in moist, shady places, near the perennial snow. In full flower at the end of July.

Distribution: Arctic and alpine regions of Europe, Caucasia, Turkestan, the Thian-Shan, Siberia, eastwards to Kamtchatka, and northwards to about 70° north lat., Mongolia, northern China, Manchooria, the Himalayas, Tibet, Sakhalin, Japan, North America.

Viola uniflora L. Spec. Pl. ed. II (1763) p. 1327; Ledeb. Fl. Alt. I, p. 262; Turczan. Cat. Baical. no. 204; Ledeb. Fl. Ross. I, p. 255; Turczan. Fl. Baical.-Dahur. (1842) p. 307, no. 193; Regel, Pl. Radd. (1861) p. 499, no. 264 (quoad pl. baical. et sibir.); Крыл. Фл. Алт. I (1901) p. 126; Беккеръ, Фіалковыя въ Федченко, Фл. Азіат. Россіи 8 (1915) p. 92.

I have only a single specimen in my collection, taken near Kalna, on the Upper Amyl, in somewhat moist, shady places, in brush-wood. With ripe fruits in the middle of July.

Distribution: Southern Siberia to Kamtchatka, northern Mongolia, Manchooria, Corea, Japan.

Viola altaica Ker.-Gawl. in Edwards Bot. Regist. (1815) p. 54; Ledeb. Fl. Alt. I, p. 263; Ledeb. Fl. Ross. I, p. 255; Turczan. Fl. Baical.-Dahur. (1842) p. 308, no. 194; Wittrock, *Viola*-studier I, p. 104 (Act. Hort. Berg. II, 1897); Крыл. Фл. Алт. I (1901) p. 127; Беккеръ, Фіалковыя въ Федченко, Фл. Азіат. Россіи 8 (1915) p. 98.

Very common in the Altaian, on the Upper Sisti-kem, among mosses and lichens, at altitudes of about 2100 m. above sea-level where it is one of the most characteristic plants, growing together with *Gentiana algida* and *Gentiana altaica, Phyllodoce coerulea, Saxifraga stellaris* var. *comosa*, and others. Collected in full flower at the end of July.

Distribution: The Crimea, the Caucasus and south-western Asia, the Thian-Shan, the Altai and Sayansk districts, Baikal and Trans Baikal.

Thymelaeaceae Reichenb.

Daphne Mezereum L. Spec. Pl. ed. II (1762) p. 509; Ledeb. Fl. Alt. II, p. 71; Turczan. Cat. Baical. no. 993; Ledeb. Fl. Ross. III, p. 546; Turczan. Fl. Baical.-Dahur. (1852) p. 466, no. 996; Herder, Pl. Radd. (1892) p. 345, no. 107; Крыл. Фл. Алт. V (1909) p. 1178.

Shady places in the taiga, along the river Amyl, in woods of coniferous and foliferous trees, on the Sisti-kem, near Ust Algiac and at Tshebertash. Past flowering and with partly ripe fruits in July.

Distribution: Europe, except the most southern and the arctic parts, Caucasia, Asia Minor and south-western Asia, Siberia, in the Yenisei valley northwards to about 60° north lat., and eastwards to the government of Irkutsk, northern Mongolia. Is replaced in eastern Asia by the nearly allied species: *D. kamczatika* Maxim., *D. Pseudo-Mezereum* Asa Gray, and *D. jezoensis* Maxim.

Elaeagnaceae Lindl.

Hippophaë rhamnoides L. Spec. Pl. ed. II (1763) p. 1452; Ledeb. Fl. Alt. IV, p. 293; Turczan. Cat. Baical. no. 996; Ledeb. Fl. Ross. III, p. 552; Turczan. Fl. Baical.-Dahur. (1852) p. 467, no. 997; Herder, Pl. Radd. (1892) p. 346, no. 109; Крыл. Фл. Алт. V (1909) p. 1180.

On the banks of the river Kemchik, near the junction with the Yenisei. With fruits at the beginning of September.

Distribution: Europe, except the arctic and most southern parts, Caucasia, Asia Minor, south-western Asia to the Himalayas and Tibet, southern Siberia, eastwards to Trans Baikal, northern Mongolia.

Onagraceae Lindl.

Epilobium angustifolium L. Spec. Pl. ed. II (1762) p. 493; Haussknecht, Monogr. Gatt. *Epilobium* (1884) p. 37; Ledeb. Fl. Alt. II, p. 68; Turczan. Cat. Baical. no. 451; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 331; Ledeb. Fl. Ross. II, p. 105; Turczan. Fl. Baical.-Dahur. (1844) p. 222, no. 442; Крыл. Фл. Алт. II (1903) p. 429.

This plant is one of the very most frequent and characteristic ones in the Urjankai country and in the frontier regions of Siberia. It is especially frequent over tracts previously ravaged by forest fires, where it is one of the very first plants immigrating, constituting within a short time a nearly impenetrable growth, to over a man's height. Thus it may be seen to cover, nearly sole prevailing, large stretches to several square miles wide, giving the scenery in the flowering season, in July and August, a purple appearance. Besides the common form with red flowers, I have also collected specimens with white petals, *f. albiflorum*.

Distribution: Throughout Europe and Asia, southwards to the East Indies, Sakhalin, rare in eastern Asia, North America, southwards roughly to California.

Epilobium latifolium L. Spec. Pl. ed. II (1762) p. 494; Ledeb. Fl. Alt. II, p. 68; Turczan. Cat. Baical. no. 452; Ledeb. Fl. Ross. II, p. 106; Turczan. Fl. Baical.-Dahur. (1844) p. 223, no. 443; Haussknecht, Monogr. Gatt *Epilobium* (1884) p. 190; Крыл. Фл. Алт. II (1903) p. 430.

Pretty common in the Sisti-kem valley, on sandy river-banks, where collected by me in flower and in part done flowering at the beginning of August.

Distribution: Arctic islands, arctic Russia, northern Ural, arctic and alpine tracts of Siberia, eastwards to the Amoor Province, the Thian-Shan, Turkestan, northern Mongolia, western Himalayas, North America, and Greenland.

Epilobium montanum L. Spec. Pl. ed. II (1762) p. 494; Haussknecht, Monogr. Gatt. *Epilobium* (1884) p. 74; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 334; Крыл. Фл. Алт. II (1903) p. 432.

Rather abundant in the subalpine taiga territory about the Amyl and on the Sisti-kem, especially in waste places, thickets, and the like. Flowering in July and August.

Distribution: Throughout Europe, Caucasia, south-western and central Asia, southern Siberia, eastwards to about the Baikal district.

Epilobium palustre L. Spec. Pl. ed. II (1762) p. 495; Haussknecht, Monogr. Gatt. *Epilobium* (1884) p. 128; Ledeb. Fl. Alt. II, p. 70; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 336; Ledeb. Fl. Ross. II, p. 109; Turczan. Fl. Baical.-Dahur. (1844) p. 224, no. 444 p. p. *(f. α);* Крыл. Фл. Алт. II (1903) p. 433.

Very common in humid, grass-grown places, on the borders of swamps, on river-banks, etc., throughout the territory traversed. About Minusinsk, at Kushabar, in the Amyl valley, Ust Algiac, Ust Sisti-kem, at Ust Kamsara, near the Tara-kem, and in several places along the river Bei-kem. Collected in flower and with fruits in July and August. The specimens collected exhibit considerable variations in size, ramification, shape of leaves, pubescence, etc.

Distribution: Europe, Novaya Zemlya, Siberia, eastwards to the Sea of Okhotsk, Turkestan, northern Persia, Asia Minor, northern Mongolia, northern China, Sakhalin, Tibet, India, North America, Greenland.

Epilobium anagallidifolium Lamarck, Encycl. II (1786) p. 376; Haussknecht, Monogr. Gatt. *Epilobium* (1884) p. 152; Крыл. Фл. Алт. II (1903) p. 434. *E. alpinum* L. Spec. Pl. ed. II (1762) p. 495; Ledeb. Fl. Alt. II, p. 70; Turczan. Cat. Baical. no. 453; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 335; Ledeb. Fl. Ross. II, p. 111; Turczan. Fl. Baical.-Dahur. (1844) p. 225, no. 445.

Scattered in the Altaian, from about the limit of tree vegetation, especially in humid places, along mountain brooklets, and the like. With fruits at the end of July.

Distribution: Arctic and alpine tracts of Europe, arctic islands, the Caucasus, arctic and alpine tracts of Siberia, eastwards to the Tshuktsher Peninsula, the Altai and Sayansk districts, Russian Turkestan, North America.

Epilobium davuricum Fischer in Hornem. Hort. Hafn. Supplem. p. 44; Haussknecht, Monogr. Gatt. *Epilobium* (1884) p. 145; Turczan. Cat. Baical. no. 454. *E. palustre* L. *γ albescens* Wahlenb., Ledeb. Fl. Ross. II, p. 109. *E. palustre β* Turczan. Fl. Baical.-Dahur. (1844) p. 224, no. 444.

In moist, grass-grown places, scattered in the Amyl taiga. Near Ust Algiac, in swampy places, I have collected some specimens of a thin and slender form, recalling, in many characters, *Epilobium palustre.* The stem, wanting stolons and distinct leaf rosettes at the base, is very slender and fine, only about 0,5 mm. thick, weak, and more or less winding, 15—20 cm. high, reddish below, green above, round, or slightly quadrangular, finely bilaterally pubescent, always simple and one-flowered. The leaves are always opposite, sessile, with a plane margin, only with a single vein, linear, 1—5 mm. broad, and 15 mm. long, the lower ones comparatively broader, the upper ones mostly narrower, the margin entire or only very finely and indistinctly serrulate and ciliate, subobtuse at the apex. The flower small, 4—5 mm. long, nodding. The calyx glabrate or pubescent, its lobes about twice as long as broad, obtuse or slightly acutish at the summit. The petals 4—5 mm. long, white. The capsule sparingly pubescent..

In point of external habitus the present plant resembles *Epilobium davuricum,* but the absence of leaf rosettes, the more or less bilateral hairiness of the stem, the opposite leaves, and the sparingly hairy capsules are characters recalling *Epilobium palustre.* It is possibly to be regarded as the bastard between these 2 species. The specimens are also very suggestive of specimens of the bastard *Epilobium davuricum* × *palustre,* which I have seen in the herbarium of the University at Christiania. My material, however, is to scarce for a quite sure decision.

Distribution: *Epilobium davuricum* is distributed in northern Europe, northern Asia, southwards to northern Mongolia, North America.

Circaea lutetiana L. Spec. Pl. ed. II (1762) p. 12; Ledeb. Fl. Ross. II, p. 113; Крыл. Фл. Алт. II (1903) p. 435.

Near Kushabar, in shady thicket of foliage trees, in moist places. Collected with flower-buds in the middle of July. The leaves are rather narrow, 6—8 cm. long, and 2—3 cm. broad when full-grown, rounded at the base.

Distribution: Europe, northwards to southern Scandinavia, the Caucasus and south-western Asia, Siberia, eastwards to the Amoor Province, the Himalayas, Japan, North Africa, North America.

Circaea alpina L. Spec. Pl. ed. II (1762) p. 12; Ledeb. Fl. Alt. I, p. 42; Turczan. Cat. Baical. no. 455; Ledeb. Fl. Ross. II, p. 114; Turczan. Fl. Baical.-Dahur. (1844) p. 226, no. 446; Крыл. Фл. Алт. II (1903) p. 436.

Among mosses in shady, moist coniferous woods at Ust Sisti-kem, near the banks of the Bei-kem, and near the Dora Steppe, on decayed, moss-grown stumps of trees. Nearly past flowering, and with partly ripe fruits in the first half of August.

Distribution: Northern and middle Europe, Asia, southwards to Asia Minor and the Himalayas, China, Manchooria, Sakhalin, North America.

Halorrhagidaceae R. Br.

Hippuris vulgaris L. Spec. Pl. ed. II (1762) p. 6; Ledeb. Fl. Alt. I, p. 7; Turczan. Cat. Baical. no. 461; Ledeb. Fl. Ross. II, p. 119; Turczan. Fl. Baical.-Dahur. (1844) p. 232, no. 452; Крыл. Фл. Алт. II (1903) p. 439.

Pretty common in slow streams and still creeks of the rivers Abakan and Kamuishto, in the Amyl, near Kushabar, at Ust Sisti-kem, in the Tara-kem, and in swamps near the Dora Steppe. Specimens collected about the middle of June bearing already ripe fruits of a black colour.

Besides the typical species, with leaves about 1 mm. broad, I have collected, in the river Kamuishto, near its mouth, specimens of *f. rhaetica* Zschokke, distinguished by filiform and comparatively short leaves, hardly 0,5 mm. broad.

Distribution: Nearly throughout Europe and Asia, in the Yenisei valley northwards to towards 72° north lat., and southwards to Persia, the Himalayas, Tibet, Mongolia, China (about Peking), North and South America, Greenland.

Umbelliferae Juss.

Cicuta virosa L. Spec. Pl. ed. II (1762) p. 368; Ledeb. Fl. Alt. I, p. 339; Turczan. Cat. Baical. no. 505; Ledeb. Fl. Ross. II, p. 241; Turczan. Fl. Baical.-Dahur (1841) p. 709, no. 495; Крыл. Фл. Алт. II (1903) p. 493.

Common in the tracts about the river Abakan, on borders of still creeks, in grass-grown and inundated places on the islets, etc., and also in swampy places near the Tara-kem. At the end of June only the characteristic leaves and quite young flower-buds were to be found on the islets in the Abakan.

Distribution: Europe, throughout Siberia from the Ural to the Sea of Okhotsk, in the Yenisei valley northwards to 71° north lat., Russian Turkestan, northern Mongolia, China, Cashmere, Sakhalin, Japan, North America.

Aegopodium alpestre Ledeb. Fl. Alt. I, p. 354; Turczan. Cat. Baical. no. 508; Ledeb. Fl. Ross. II, p. 248; Turczan. Fl. Baical.-Dahur. (1844) p. 711, no. 498; Крыл. Фл. Алт. II (1903) p. 496.

Near Kushabar, and pretty common in the Amyl valley, as for instance at Petropawlowsk, at Kalna, and in several places in the subalpine wooded tracts of the Sayansk mountains, in meadows in woods, and near habitations. In the Urjankai country I have found it near Ust Algiac, and on the banks of the river Sisti-kem. Flowering in July and August.

Distribution: Siberia, roughly from the government of Tomsk and eastwards through the Altai and Sayansk regions to the Amoor Province and Manchooria, Russian Turkestan, northern Mongolia, Sakhalin.

Carum Carvi L. Spec. Pl. ed. II (1762) p. 378; Ledeb. Fl. Alt. I, p. 353; Turczan. Cat. Baical. no. 509; Ledeb. Fl. Ross. II, p. 248; Turczan. Fl. Baical.-Dahur. (1844) p. 712, no. 499; Крыл. Фл. Алт. II (1903) p. 497.

Pretty common in the Minusinsk district, especially in dry meadows and on hills, where it begins flowering in the early days of June. It occurs in my collections from the Abakan Steppe, near Askys, from Ust Abakansk, and from Kushabar; it also occurs scattered in the Amyl valley and at Ust Sisti-kem. Near Ust Kamuishto I have collected specimens of f. *atrorubens* Lange, Haandbog (1864) p. 219.

Distribution: Europe, Siberia, northwards to about 61° north lat., and eastwards roughly to Lake Baikal, south-western Asia, northern Mongolia, the Himalayas, North America (introduced from Europe).

Schultzia crinita Spreng. Spec. *Umbellif.* (1818) p. 102; Turczan. Cat. Baical. no. 506; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 373; Ledeb. Fl. Ross. II, p. 258; Turczan. Fl. Baical.-Dahur. (1844) p. 710, no. 496; Крыл. Фл. Алт. II (1903) p. 499. *Athamanta crinita* Ledeb. Fl. Alt. I, p. 326.

In the Altaian, in grass- and moss-grown places above the limit of tree vegetation, near the Upper Sisti-kem. In full flower at the end of July.

Distribution: The Thian-Shan, the Altai and Sayansk regions, eastwards to the southern part of the government of Irkutsk, northern Mongolia.

Sium cicutaefolium Gmel. System. Nat. II (1791) p. 482; Ledeb. Fl. Ross. II, p. 260. *Sium lancifolium* β Ledeb. Fl. Alt. I, p. 352; Крыл. Фл. Алт. II (1903) p. 501. *Critamus dauricus* Hoffm. *Umbellif.* (1814) p. 184; Turczan. Fl. Baical.-Dahur. (1844) p. 717, no. 503.

In swampy places near the mouth of the river Uibat, and here and there in swampy, grassy places on islets in the river Abakan. At the end of June there were as yet to be found here only flowerless specimens. The plant, however, is very readily distinguished by its characteristic leaves.

Distribution: South-eastern Siberia, northern China, Manchooria, Corea, North America.

Bupleurum longifolium L. (emend. Wolff) *var.* **aureum** (Fisch.) Wolff, *Umbellif.* etc. in Engl. Pflanzenr. H. 43 (IV, 228, 1910) p. 52; Козо-Полянскій, Зонтичныя въ Федченко, Фл. Азіат. Россіи 10(1915)p. 36; Koso-Poljanski, Epit. *Bupleurum* Rossiae (Act. Hort. Petropol. XXX (1914) p. 245). *B. aureum* Fisch. apud Hoffm. Gen. *Umbellif.* ed. II (1816) p. 115; Ledeb. Fl. Alt. I, p. 348; Turczan. Cat. Baical. no. 514; Karel. et Kiril. Enum. Pl. Fl. Alt. 379; Ledeb. Fl. Ross. II, p. 263; Turczan. Fl. Baical.-Dahur. (1844) p. 718, no. 504;

Крыл. Фл. Алт. II (1903) p. 503. *Euphorbia perfoliata* Scheutz, Pl. Vasc. Jenis. in Kgl. Sv. Vet. Akad. Handling. XXII (1888) p. 158 sec. Литвиновъ, Библиогр. (1909) p. 345.

Common in the Urjankai country and in the tracts traversed bordering upon Siberia, especially in open copse wood of birch and other foliage trees, where it is a characteristic plant: along the river Algiac, at Ust Algiac, in the Altaian, near the tree limit, at Ust Sisti-kem, and on the Kamsara. Collected in flower in the second half of July and in the first half of August.

All of the specimens collected are distinguished by having the bracts of the involucels small, roundish, broadly cordiform, 4—7 mm. in diameter. The involucre consists of 3—4 bractlets of a much varying size and shape, 0,3—1,4 cm. long, from nearly circular to narrowly ovate, with slightly pointed apices. The stem, sometimes rather much twisted, is 30—50 cm. high; the lower leaves commonly 7—8 cm. long (rarely to 13 cm. long), and about 2 cm. broad, broadly lanceolate, clasping the stem, or also rather suddenly narrowed into a shorter or longer petiole, the apex slightly subobtuse or subacute, frequently furnished with a fine prickle. The upper leaves are sessile, shorter, to nearly cordiform, with a broad, cordiform base clasping the stem. The plant is of a rather strongly marked yellow, especially so the upper parts.

Distribution: The variety *aureum* occurs in south-eastern Russia, Turkestan, Dzungaria, southern and eastern Siberia (in the Yenisei valley to about 58° north lat.), through the Altai and Sayansk regions, eastwards throughout Trans Baikal and northern China to the Amoor Province, northern Mongolia.

Bupleurum triradiatum (Hoffm.) Adams, Nouv. Mem. Soc. Natur. Moscou IX (1834) p. 235; Turczan. Cat. Baical. no. 516; Ledeb. Fl. Ross. II, p. 264; Turczan. Fl. Baical.-Dahur. (1844) p. 719, no. 506; Крыл. Фл. Алт. II (1903) p. 504; Козо-Полянскій, Зонтичныя въ Федченко, Фл. Азіат. Россіи 10 (1915) p. 14. *B. ranunculoides var. triradiatum* (Adams) Regel, Wolf, *Umbellif.* in Engl. Pflanzenr. H. 43 (IV, 228, 1910) p. 117; Koso-Poljanski, Epit. *Bupleurum* Rossiae (1914) p. 198. *B. ranunculoides β oblongifolium* Ledeb. Fl. Alt. I, p. 348.

Stems 15—20 cm. high, generally unramified. The basal leaves few, narrowly ovate-lanceolate. Bracts of the involucre 3, mostly of unequal size, to 1 cm. long, ovate, with a cordiform base, more or less subobtuse at the apex. Umbels 3- to 4-rayed. Involucels of 5—8 small bractlets, 6—7 mm. long, obtuse at the top, and sometimes furnished with a fine point. Each umbellet consisting of 20—25 flowers. In the Altaian, in grass-grown places above the tree limit, not unfrequently accompanying *Betula rotundifolia*, in places grown with lichens and mosses. Collected in full flower at the end of July.

Distribution: Turkestan, southern Siberia, through the Altai and Sayansk regions, northern Mongolia, Trans Baikal, eastwards to Kamtchatka and the Amoor Province, Sakhalin, Japan, North America.

Bupleurum multinerve DC. in Mem. Soc. Phys. et Hist. Nat. Geneve IV (1828) p. 500; Wolff, *Umbellif.* in Engl. Pflanzenr. H. 43 (IV, 228, 1910) p. 119; Turczan. Cat. Baical.

no. 517; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 378; Ledeb. Fl. Ross. II, p. 264; Turczan. Fl. Baical.-Dahur. (1844) p. 720, no. 507; Крыл. Фл. Алт. II (1903) p. 505. *B. ranunculoides* Pall. (non L.), Ledeb. Fl. Alt. I, p. 347 (excl. var. β). *B. ranunculoides* L. var. *multinerve* (DC.) Koso-Poljanski, Epit. *Bupleurum* Rossiae (1914) p. 191; Козо-Полянскій, Зонтичныя въ Федченко, Фл. Азіат. Россіи 10 (1915) p. 14.

Pretty common in steppe meadows, on dry hills, and the like, about the river Abakan, at Ust Sisti-kem, on the Kamsara, and near the Dora Steppe. The species begins flowering in the middle of June.

Distribution: Eastern Russia, through southern Siberia, in the Yenisei valley to 57° north lat., Manchooria, northern Tibet, north-western Mongolia, Japan.

Bupleurum falcatum L. Spec. Pl. ed. II (1762) p. 341, sensu latissimo, emend. Wolff, *Umbellif.* in Engl. Pflanzenr. H. 43 (IV, 228, 1910) p. 127; Ledeb. Fl. Alt. I, p. 349; Turczan. Cat. Baical. no. 517; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 378; Ledeb. Fl. Ross. II, p. 266; Крыл. Фл. Алт. II (1903) p. 58; Козо-Полянскій, Зонтичныя въ Федченко, Фл. Азіат. Россіи 10 (1915) p. 23.

subspec. **bicaule** (Helm.) Koso-Poljanski, Epit. *Bupleurum* Rossiae (1914) p. 217 et l. c. (1915) p. 25. *B. baldense* Ledeb. Fl. Alt. I, p. 350, ex parte. *B. exaltatum* Ledeb. Fl. Ross. II, p. 266, ex parte; Turczan. Fl. Baical.-Dahur (1844) p. 722. no. 510. *B. falcatum* subspec. *exaltatum* var. *bicaule* Wolff, l. c. (1910) p. 140.

var. **angustifolium** (Ledeb.) Koso-Poljanski, l. c. (1914) p. 217 et l. c. (1915) p. 26. *B. angustifolium* Ledeb. Fl. Ross. II, p. 265.

In dry steppe meadows at Ust Kamuishto, where associated with plants as *Iris ensata* and the like. Most of the specimens collected bearing only young flower-buds, only few with opened flowers at the end of June. Collected nearly past flowering at Sebi, at the end of August.

Distribution: Southern Siberia, from the Altai through the Sayansk region to Trans Baikal and northern Mongolia.

subspec. **eufalcatum** Wolff, l. c. (1910) p. 129 *var.* **scorzonerifolium** (Willd.) Wolff, l. c. (1910) p. 132. *B. falcatum* in Ledeb. Fl. Alt. I, p. 349, ex parte. *B. scorzoneriaefolium* Willd. Enum. Hort. Berol. I (1809) p. 300; Turczan Fl. Baical.-Dahur. (1844) p. 721, no. 509. *B. falcatum var. scorzonerifolium* (Willd.) Ledeb. Fl. Ross. II, p. 267; Koso-Poljanski, Epit. *Bupleurum* Rossiae (1914) p. 219 et in Федченко, Фл. Азіат. Россіи 10 (1915) p. 27.

In dry thickets and meadows on the islets in the Yenisei, near Ust Abakansk. With young flower-buds in the first half of June.

Distribution: Southern Siberia, from the Altai to the Amoor Province, northern China, Corea, Manchooria, Japan.

Aethusa Cynapium L. Spec. Pl. ed. II (1762) p. 367; Ledeb. Fl. Ross. II, p. 270.

This species, which seemed to be very rare in Siberia, I have met with in waste places near habitations in the Amyl taiga; in full flower in the middle of July.

Distribution: Europe, Siberia, North America (adventive from Europe).

Libanotis montana All. Fl. Pedemont. II, p. 30.

var. **sibirica** (L.) Krylow, Фл. Алт. II (1903) p. 515. *L. sibirica* C. A. Meyer, Ind. Cauc. p. 124; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 385, incl. *L. buchtormensis* no. 384; Ledeb. Fl. Ross. II, p. 279. *Seseli athamantoides* Ledeb. Fl. Alt. I, p. 342.

Scattered in dry meadows and in open brush-wood on islets in the river Abakan, and in grass-grown places on the steppes about the river. With young flowers at the end of June.

Distribution: Middle and eastern Russia, Caucasia, south-western Asia, Siberia, eastwards to about Yakutsk.

Cenolophium Fischeri Koch, *Umbellif.* p. 103; Turczan. Cat. Baicał. no. 524; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 387; Ledeb. Fl. Ross. II, p. 282; Turczan. Fl. Baical.-Dahur. (1844) p. 730, no. 518. *Silaus longifolius var.* β Ledeb. Fl. Alt. I, p. 324; Крыл. Фл. Алт. II (1903) p. 516.

Pretty common in moist and inundated grass-field on an islet in the river Abakan, near Ust Kamuishto. Specimens taken at the end of June, were as yet flowerless, and only the characteristic leaves were to be found. The segments of the leaves in the specimens collected are linear, about 1,5—2,5 mm. broad, and 2—2,5 cm. long, mucronate at the apex. The specimens belong to β *divaricatum* (Besser) Ledeb. Fl. Ross. II, p. 282. In the Urjankai country I have found the species at Ust Tara-kem, nearly past flowering and with fruits at the end of August, and at Bjelosarsk.

Distribution: Eastern parts of Europe, from Prussia, Siberia to towards Trans Baikal, Russian Turkestan, northern Mongolia.

Cnidium venosum Koch, *Umbellif.* p. 109; Ledeb. Fl. Alt. I, p. 329; Ledeb. Fl. Ross. II, p. 283 (excl. syn. *Cn. salinum* Turczan.); Крыл. Фл. Алт. II (1903) p. 517.

Scattered in slightly moist meadows on an islet in the Yenisei, near Ust Abakansk. Only young, as yet not flowering specimens at the end of June.

Distribution: Middle Europe, northwards to Denmark, Russia, Siberia, eastwards to Lake Baikal, and southwards to Semipalatinsk.

Conioselinum Fischeri Wimmer et Grabowski, Fl. Silesiae I (1827) p. 266; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 388; Ledeb. Fl. Ross. II, p. 290; Крыл. Фл. Алт. II (1903) p. 519. *Selinum Gmelini* Bray in Denkschr. Bot. Ges. Regensb. II, p. 36; Ledeb. Fl. Alt. I, p. 318. *C. tataricum* Fisch. in Hoffm. *Umbellif.* ed. II (1816) p. 185. *C. univittatum* Turczan. Cat. Baical. no. 531; Turczan. Fl. Baical. Dahur. (1844) p. 735, no. 524.

In subalpine thickets of foliage trees, in slightly moist places on the banks of the Amyl, near Semiretska, and on the Sisti-kem, near Ust Algiac. Young flower-buds in the middle of July.

Distribution: East of Europe, from eastern Germany and Hungary, Siberia, eastwards roughly to Lake Baikal, in the Yenisei valley northwards to 71° north lat., northern Mongolia.

Angelica silvestris L. Spec. Pl. ed. II (1762) p. 361; Ledeb. Fl. Alt. I, p. 318; Turczan. Cat. Baical. no. 535; Ledeb. Fl. Ross. II, p. 296; Turczan. Fl. Baical.-Dahur. (1844) p. 737, no. 527; Крыл. Фл. Алт. II (1903) p. 521.

In marshy places near streams, and the like, about Kushabar, in the Amyl taiga, on the Upper Algiac, and in several places about the Sisti-kem. The species flowers here in July and August.

Distribution: Europe, Caucasia, Siberia, in the Yenisei valley northwards to about 62° 45′ north lat., eastwards to Trans Baikal and the Tshuktsher Peninsula, northern Mongolia.

Archangelica decurrens Ledeb. Fl. Alt. I, p. 316; Turczan. Cat. Baical. no. 537; Ledeb. Fl. Ross. II, p. 297; Turczan. Fl. Baical.-Dahur. (1844) p. 739, no. 528; Крыл. Фл. Алт. II (1903) p. 522.

Pretty common in brush-wood and in slightly moist, grass-grown places on islets in the river Abakan, near Kushabar, in the Amyl taiga, and, moreover, rather frequent in the Urjankai country, about Ust Algiac, and on the Kamsara. The species begins flowering about the middle of July. In the taiga territory this species is frequently to be found associated with *Delphinium elatum*, and sometimes *Veratrum album*, forming in places a dense, nearly impenetrable growth, 2—3 m. tall.

Distribution: Siberia, in the Yenisei valley northwards to 71° north lat., and eastwards roughly to the governments of Yakutsk and Irkutsk, Turkestan, northern Mongolia.

Peucedanum vaginatum Ledeb. Fl. Alt. I, p. 312; Turczan. Cat. Baical. no. 541 (incl. *P. seseloides* Turczan. l. c. no. 542 et *P. puberulum* Turczan. l. c. no. 543); Ledeb. Fl. Ross. II, p. 312; Turczan. Fl. Baical.-Dahur. (1844) p. 744, no. 533 (incl. *P. seseloides* Turczan. l. c.); Крыл. Фл. Алт. II (1903) p. 529.

Pretty common in dry, sandy meadows on an islet in the river Abakan, near Ust Kamuishto, where collected by me with young flowers at the end of June, moreover at Ust Tara-kem and on the Dora Steppe, nearly past flowering in the first half of August.

Distribution: Southern Siberia, roughly from the government of Tomsk, eastwards to the Amoor Province, northern Mongolia.

Peucedanum salinum Pall. in Willd. Herb. no. 5743; Ledeb. Fl. Ross. II, p. 313; Крыл. Фл. Алт. II (1903) p. 530. *P. humile* Turczan. Cat. Baical. no. 544; Turczan. Fl. Baical.-Dahur. (1844) p. 745, no. 534.

On the Lower Sisti-kem, at Ust Kamsara, and on the Tara-kem, in swampy meadows and marshes in brush-wood. With flowers about the middle of August.

Distribution: Siberia, in the Yenisei valley northwards to about 70° north lat., eastwards to the Sea of Okhotsk, northern Mongolia.

Peucedanum baicalense Koch, *Umbellif.* p. 94; Turczan. Cat. Baical. no. 538; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 394; Ledeb. Fl. Ross. II, p. 313; Turczan. Fl. Baical.-Dahur.

(1844) p. 746, no. 535; Крыл. Фл. Алт. II (1903) p. 531. *P. polyphyllum* Ledeb. Fl. Alt. I, p. 314.

On dry declivities and rocky slopes at Ust Kamsara and Ust Tara-kem; in flower and partly done flowering at the end of August.

Distribution: Southern Siberia from about Semipatinsk to the government of Irkutsk, northern Mongolia.

Heracleum dissectum Ledeb. Fl. Alt. I, p. 301; Turczan. Cat. Baical. no. 548; Ledeb. Fl. Ross. II, p. 323; Turczan. Fl. Baical.-Dahur. (1844) p. 748, no. 537; Крыл. Фл. Алт. II (1903) p. 533.

In Фл. Маньчжурии III (1907), the excellent work on the vegetation of eastern Asia, Komarow identifies this species with the American *H. lanatum* Michx. (Fl. Bor. Amer. 1803, p. 166), agreeing with Maximowicz, who has examined this group of *Heracleum* in point of monography. Moreover, he refers as synonyms of this species: *H. barbatum* Leder., *H. dulce* Fischer, and *H. Moellendorffii* Hance. However, as I want sufficient material for enabling me to form any opinion whether this be right, I have chosen to enter the species here under Ledebour's earliest name given to the plant peculiar to the interior of Asia.

The species is pretty common in meadows and in copse wood on islets in the river Abakan, where I have collected it with young flowers at the end of June. It is also rather frequent about Kushabar, and in the subalpine tracts about the Upper Amyl, moreover, in the Urjankai country, about the basins of the rivers Algiac, Sisti-kem, Kamsara, and Tara-kem, where, in places, covering glades, and the like, over large tracts. In the Altaian it ascends to about the tree limit.

Distribution: Siberia, in the Yenisei valley northwards to past 70° north lat., and eastwards to the Amoor Province, Kamtchatka, Turkestan and northern Mongolia, Sakhalin, Japan, Corea and China. If, conformable to Komarow, l. c., it is to be identified with *H. lanatum*, there must still be added to its geographical range: North America, southwards to about Utah.

Anthriscus silvestris (L.) Hoffm. Gen. *Umbellif.* (1814) p. 40; Ledeb. Fl. Ross. II, p. 346; Turczan. Fl. Baical.-Dahur. add. et emend. (1857) p. XXIX, no. 1431; Крыл. Фл. Алт. II (1903) p. 538. *Chaerophyllum silvestre* L. Spec. Pl. ed. II (1762) p. 369.

Near Kushabar, in meadows, and at Ust Algiac, Ust Sisti-kem and Ust Tara-kem, in brush-wood, near the river. I have found it flowering in the second half of July.

Distribution: Europe, Caucasia, and south-western Asia, Siberia, in the Yenisei valley northwards to about 70° north lat., eastwards to Kamtchatka, Manchooria, China, Japan, northern Mongolia, Cashmere, India, North Africa.

Pleurosperum austriacum (L.). Hoffm. Gen. *Umbellif.* (1814) p. 8; Ledeb. Fl. Alt. I, p. 368; Ledeb. Fl. Ross. II, p. 360; Turczan. Fl. Baical.-Dahur. (1844) p. 753, no. 541. *P. uralense*

Hoffm. l. c.; Turczan. Cat. Baical. no. 551; Ledeb. Fl. Ross. II, p. 361; Крыл. Фл. Алт. II (1903) p. 542. *P. kamtschaticum* Hoffm. l. c.; Ledeb. Fl. Ross. II, p. 361.

Common on islets in the river Abakan, in shady meadows and open brush-wood, where it begins flowering in the last days of June. I have also found it in the Urjankai country, near the Sisti-kem, and on the Kamsara, on declivities near the river, nearly past flowering in the first half of August.

Distribution: Central and eastern Europe, westwards roughly to Switzerland, nearly throughout Siberia, in the Yenisei valley northwards to 69½° north lat., Kamtchatka, northern Mongolia, Manchooria, Sakhalin, Japan.

Cornaceae Link.

Cornus alba L. Mantissa (1767) p. 40; Ledeb. Fl. Alt. I, p. 150; Turczan. Cat. Baical. no. 556; Ledeb. Fl. Ross. II, p. 379; Turczan. Fl. Baical.-Dahur. (1845) p. 299, no. 544. *C. sibirica* C. A. Meyer, Mem. Acad. Petropol. V, p. 206; Крыл. Фл. Алт. II (1903) p. 545.

Very common on islets in the rivers Yenisei and Abakan, where forming copse wood to about 3 m. high, and where it begins flowering in the early days of June; moreover, found scattered near Kushabar, and on islets in the Bei-kem and Ulu-kem, and also on the river-banks, where I have collected it with fruits in the second half of August.

Distribution: North-eastern Russia, throughout Siberia, northwards, about the river Ob, to 64° north lat., northern Mongolia, northern China, Manchooria, Sakhalin.

Pyrolaceae Dumort.

Pyrola rotundifolia L. Spec. Pl. ed. II (1762) p. 567; Ledeb. Fl. Alt. II, p. 99; Bunge, Enum. Alt. p. 20; Turczan. Cat. Baical. no. 750; Ledeb. Fl. Ross. II, p. 928; Turczan. Fl. Baical.-Dahur. (1848) p. 505, no. 752; Herder, Pl. Radd. (1872) p. 356, no. 54. *P. rotundifolia* L. *α albiflora* Крыл. Фл. Алт. III (1904) p. 796.

Scattered in the Amyl taiga, in coniferous forest. In full flower in the middle of July.

subspec. **incarnata** DC. Prodrom. VII, p. 773; Ledeb. Fl. Ross. II, p. 928; Turczan. l. c. (1848) p. 506; Herder, l. c. (1872) p. 357; Крыл. Фл. Алт. l. c. (1904) p. 796.

This subspecies, considered by some as a distinct species, much recalls the preceding one, but differs by being more vigorous, further by having the thick coriaceous leaves, measuring 4—4,5 cm. in diameter, more or less distinctly cordately incised at the base, and the margin slightly and regularly serrulate. The scape is 30—35 cm. long, with scaly lanceolate — linear bracts, 1—1,5 cm. long, equalling or exceeding the pedicels. Flowers very loose, 8—20 in number, on comparatively long pedicels, 1—1,5 cm. long. The sepals, as well as the petals, are of a reddish purple colour. The present subspecies is frequently to be met with in the subalpine coniferous forest, and also follows the spurs

of the taiga down into the steppe region, and is in the Sayansk district more common than the main species. I have collected it in the Amyl valley, at Ust Algiac, Ust Sisti-kem, on the Kamsara, and at Ust Tara-kem.

Distribution: The typical species occurs in northern and middle Europe, southwards to middle Spain and Italy, Caucasia, throughout Siberia, northwards to 70° 30′ north lat., Turkestan, northern Mongolia, the Himalayas, northern China, Manchooria, Corea, Japan, North America, Greenland. The subspecies *incarnata* is confined to the eastern portions of Asia, roughly from the Sayansk mountains to Kamtchatka, northern Mongolia, China, Manchooria, Japan, north-western America (Sitka Island).

Pyrola media Swartz in Act. Holm. (1804) p. 257; Ledeb. Fl. Ross. II, p. 929; Herder, Pl. Radd. (1872) p. 361, no. 57; Крыл. Фл. Алт. III (1904) p. 796.

In coniferous forest on the river Amyl, near Semiretska. In full flower in the middle of July. This plant seemed to be rare in Siberia. Thus, as late as in 1872, it was not known from Siberia at all, as HERDER, l. c. writes: „Ihr Vorkommen in Sibiria dagegen ist zwar sehr wahrscheinlich, aber noch nicht nachgewiesen". Later on, however, it has been found in western Siberia, in the governments of Tobolsk and Tomsk, but not heretofore — as far as I know — in the government of Yeniseisk, where my finding-place on the river Amyl thus represents its most eastern locality as yet known in Siberia.

Distribution: Northern and middle Europe, Russia, Caucasia, Asia Minor, Siberia, eastwards roughly to the Yenisei, Japan?

Pyrola minor L. Spec. Pl. ed. II (1762) p. 567; Ledeb. Fl. Alt. II, p. 99; Turczan. Cat. Baical. no. 749; Ledeb. Fl. Ross. II, p. 930; Turczan. Fl. Baical.-Dahur. (1848) p. 506, no. 753; Herder, Pl. Radd. (1872) p. 362, no. 58; Крыл. Фл. Алт. II (1904) p. 797.

Scattered in somewhat dry coniferous forest at Kushabar, near the river Algiac, and at Ust Sisti-kem. In full flower in the second half of July.

Distribution: Northern and middle Europe, southwards to northern Spain, northern Italy and Bulgaria, Caucassia, Siberia, in the Yenisei valley northwards to past 70° north lat., and eastwards to Kamtchatka, northern Mongolia, Sakhalin, Japan, North America, Greenland.

Pyrola secunda L. Spec. Pl. ed. II (1762) p. 568; Ledeb. Fl. Alt. II, p. 98; Turczan. Cat. Baical. no. 748; Ledeb. Fl. Ross. II, p. 930; Turczan. Fl. Baical.-Dahur. (1848) p. 507, no. 754; Herder, Pl. Radd. (1872) p. 367, no. 61; Крыл. Фл. Алт. III (1904) p. 798.

This species is pretty common near Ust Kamsara, where I have collected it with half ripe fruits about the middle of August. It occurs on dry, mossy tussocks.

Distribution: Europe, except the extreme south, Caucasia and south-western portions of Asia to the Thian-Shan, throughout Siberia, in the Yenisei valley northwards to past 70° north lat., eastwards to Kamtchatka and the Amoor Province, northern Mongolia, Manchooria, Corea, Japan, North America, Greenland.

Pyrola uniflora L. Spec. Pl. ed. II (1762) p. 568; Ledeb. Fl. Alt. II, p. 98; Bunge, Enum. Alt. p. 19; Turczan. Cat. Baical. no. 747. *Moneses grandiflora* Salisb. in Gray Nat. Arrang. II (1821) p. 403; Turczan. Fl. Baical.-Dahur. (1848) p. 508, no. 755; Ledeb. Fl. Ross. II, p. 931; Herder, Pl. Radd. (1872) p. 369, no. 62; Крыл. Фл. Алт. II (1904) p. 800.

Pretty common in the Amyl valley, at Ust Algiac, and on the Sisti-kem, where I have collected it in spruce- and cedar-forest, among mosses. In full flower at the end of July.

Distribution: Europe, except the extreme south, throughout Siberia, northwards to about 65° north lat., eastwards to the Tshuktsher Peninsula and the Amoor Province, the Thian-Shan, northern Mongolia, China, Manchooria, northern Japan, North America, Greenland.

Ericaceae DC.

Ledum palustre L. Spec. Pl. ed. II (1762) p. 561; Ledeb. Fl. Alt. II, p. 97; Turczan. Cat. Baical. no. 746; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 753; Ledeb. Fl. Ross. II, p. 923; Turczan. Fl. Baical.-Dahur. (1848) p. 503, no. 751; Maxim. *Rhododendr.* Asiae Orient. (Mem. Acad. Imper. Sc. St. Petersbourg Ser. VII, T. XVI, 1870) p. 49; Крыл. Фл. Алт. III (1904) p. 793; Е. Бушъ, *Ericaceae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 3; Кузнецовъ, Вересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 6.

This species occurs in Siberia in 4 rather distinct varieties, of which the following 3 are found by me in the territory traversed:

var. **vulgare** Ledeb. Fl. Ross. l. c.; Е. Бушъ, l. c. p. 7; Кузнецовъ, l. c. p. 8. *L. palustre α genuina* Herder, Pl. Radd. (1872) p. 352, no. 52.

This variety seemed to be the most common one, and is to be met with especially in moist and boggy, frequently moss-grown places in subalpine coniferous woods. I have by the way, collected or observed this one in the following localities: Near Kalna, at Ust Algiac, where rather common in the turfy bogs, at Tshebertash, in moist, moss-grown ground in woods, near the Sisti-kem, at Ust Sisti-kem, and further on downwards along the banks of the Bei-kem, in the taiga territory to about the neighbourhood of Buluk, where the forests of conifers cease, and the climate becomes drier. In this variety, and generally also in the following ones, the three youngest year's shoots are leaf-bearing; in branches 4 years old, however, the leaves have fallen off. The youngest year's shoots are densely felted, the older ones gradually becoming more glabrate. The length of the year's shoots in this variety is generally from about 8 to 12 cm. Taken flowering and with fruits in July and August.

var. **angustum** E. Busch, l. c. (1915) p. 8. *L. palustre* var. *decumbens* Maxim. *Rhododenr.* Asiae Orient. (1870) p. 49. *L. palustre β angustifolium* Herder, Pl. Radd. (1872) p. 353.

This one differs from the preceding variety in having the leaves narrower, with much revolute margins, and seemed mostly to occur in soil, drier and hotter as regards physiological conditions. I have, by the way, found it in the wooded steppe region at Ust Sisti-kem, in wood of pine and larch, on sandy heath, associated with *Rhododendron parvifolium*, *Vaccinium vitis idaea*, etc.

var. **decumbens** Aiton, Hort. Kewensis II (1789) p. 65, III (1811) p. 48; Е. Бушъ, l. c. (1915) p. 8; Кузнецовъ, l. c. (1916) p. 8.

Specimens belonging to this variety I have collected in the Altaian, above the limit of tree vegetation, at altitudes about 1900 to 2000 m. above sea-level, on rocks and stony débris, with mosses and lichens.

Fig. 96. *Ledum palustre* L. var. *decumbens* Aiton from the Sayansk district, about 2000 m. above sea-level. (1/1).

The stems are much ramified, low, 10 to 20 cm. long, creeping, only reaching up to about 10 cm. above the ground. The year's shoots are short, generally only from 1 to 1,5 cm. long. The leaves are very narrow, from 1 to 2 mm. broad, and from 10 to 14 mm. long, with the margin much revolute. The corymbs are rather few-flowered, generally from 3 or 4 to 8 or 10-flowered. The pedicels are comparatively short, 0,5 to 1 cm. long, hairy and glandular. The length of the petals is to about 6 mm. Taken in full flower at the end of July.

Distribution: Scandinavia, excepting the western parts, Germany, Austro-Hungary, Russia, except the extreme south, throughout Siberia from the Ural to the Tshuktsher

Peninsula and Kamtchatka, northwards to Taimur, 73° 30′ north lat., northern Mongolia (the Sayansk district), Manchooria Corea, Sakhalin, Japan, North America, Greenland.

Rhododendron chrysanthum Pallas, Reise Russ. Reich. III (1776) p. 318, 352, 369, 449, Anh. p. 729, no. 87; Turczan. Cat. Baical. no. 744; Ledeb. Fl. Ross. II, p. 920; Turczan. Fl. Baical.-Dahur. (1848) p. 499, no. 748; Herder, Pl. Radd. (1872) p. 345, no. 46; Maxim. *Rhododendr.* Asiae Orient. (1870) p. 20; Крыл. Фл. Алт. II (1904) p. 791; Е. Бушъ, *Ericaceae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 15; Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 18. *R. flavum* Pallas, l. c. p. 320.

This species I have met with in the Altaian, above the limit of tree vegetation, at altitudes of about 2000 to 2100 m. above sea-level. Especially growing on dry and sunny declivities with a southern aspect, covered with mosses and lichens, associated with plants as *Gentiana algida* and *G. altaica, Dryas octopetala, Viola altaica,* and others; in some places occurring so abundantly as to form a nearly impenetrable underwood to 1 m. high. Specimens taken at the end of July are nearly past flowering, with ripe and partly ripe capsules.

Distribution: From the Altai and the Sayansk district through southern Siberia and northern Mongolia to Kamtchatka, Sakhalin, North America.

Rhododendron Anthopogon Don in Mem. Wern. Soc. III (1821) p. 409; Don, Prodrom. Fl. Nepal. (1825) p. 153; Е. Бушъ, *Ericaceae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 19; Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1915) p. 13. *Osmothamnus fragrans* DC. Prodrom. VII (1839) p. 715; Ledeb. Fl. Ross. II, p. 918. *O. pallidus* DC. Prodrom. VII (1839) p. 715; Ledeb. Fl. Ross. II, p. 918; Turczan. Fl. Baical.-Dahur. (1848) p. 498, no. 747. *R. fragrans* Maxim. *Rhododendr.* Asiae Orient. (1870) p. 16; Herder, Pl. Radd. (1872) p. 341, no. 44. *Azalea pallida* Turczan. Cat. Baical. no. 745.

var. **fragrans** (Maxim.) Kusnezow, l. c. (1915) p. 15.

In the Altaian, above the limit of tree vegetation, at an altitude of about 2000 m. above sea-level, in stony places, among mosses and lichens. Nearly past flowering at the end of July.

Distribution: The species is distributed in north-eastern Russia (Petshora), the Sayansk district, Trans Baikal, scattered in north-eastern Siberia to Kamtchatka, northern Mongolia, the Himalayas.

Rhododendron parvifolium Adams in Mem. Soc. Natur. Moscou IX (1834) p. 237; Turczan. Cat. Baical. no. 743; Ledeb. Fl. Ross. II, p. 921; Turczan. Fl. Baical.-Dahur. (1848) p. 500, no. 749; Maxim. *Rhododendr.* Asiae Orient. (1870) p. 17; Е. Бушъ, *Ericaceae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 22. *R. lapponicum* (L.) Wahlenb. var. *parvifolium* (Adams) Herder, Pl. Radd. (1872) p. 343; Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 16.

Scattered in pine- and larch-woods between Ust Sisti-kem and the Kamsara. Past flowering in the middle of August.

Distribution: Northern Mongolia and southern Siberia, from the government of Yeniseisk and eastwards to the Tshuktsher Peninsula and Kamtchatka, China, Sakhalin, North America (Isl. Unalashka).

Rhododendron dahuricum L. Spec. Pl. ed. II (1762) p. 562; Ledeb. Fl. Alt. II, p. 96; Turczan. Cat. Baical. no. 742; Ledeb. Fl. Ross. II, p. 921; Turczan. Fl. Baical.-Dahur. (1848) p. 501, no. 750; Maxim. *Rhododendr.* Asiae Orient. (1870) p. 43; Herder, Pl. Radd. (1872) p. 347, no. 48; Крыл. Фл. Алт. II (1904) p. 792; E. Бушъ, *Ericaceae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 29; Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 21.

Some specimens of this one I have collected on cliffs, on the borders of a small lake in subalpine woods of spruce and cedar in the Altaian, on the Upper Sisti-kem, about 1400 m. above sea-level. Mostly past flowering and with ripe fruits, only a few specimens in flower at the end of July. All of the specimens collected belong to var. *dauricum* Maxim. l. c. (1870) p. 44.

Distribution: From the Altai region and eastwards through southern Siberia and northern Mongolia to Kamtchatka and Manchooria, Corea, northern China, Sakhalin, Japan.

Phyllodoce coerulea (L.) Babingt. Manual. Brit. Bot. ed. I (1843) p. 194; E. Бушъ, *Ericacea* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 46; Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 33. *P. taxifolia* Salisb. Parad. Londin. I (1806) t. 56; Ledeb. Fl. Ross. II, p. 916; Maxim. *Rhododendr.* Asiae Orient. (1870) p. 6; Turczan. Fl. Baical.-Dahur. (1848) p. 497, no. 746; Herder, Pl. Radd. (1872) p. 336, no. 40.

Pretty common in the Altaian, on rocky débris, and the like, at altitudes of about 2100 m. above sea-level, together with mosses and lichens, frequently associated with *Saxifraga stellaris* subspec. *comosa;* in full flower at the end of July. The specimens agree rather perfectly with Scandinavian material, with the exception of the corolla apparently being mostly somewhat shorter than in the Scandinavian ones, and not always so markedly nodding; moreover, the style is mostly somewhat longer, so that the pistil may frequently be seen in the orifice of the corolla, while it is generally from 1 to 2 mm. shorter in Scandinavian specimens.

Distribution: Scandinavia, Scotland, the Pyrenees, northern Italy, northern Russia, the northern Ural, the Sayansk district (northern Mongolia), Baikal, Trans Baikal, the Amoor Province, the Tshuktsher Peninsula, Kamtchatka, Sakhalin, North America.

Note: The figure of this species to be found in the work quoted above, by Mme E. Busch (1915) p. 47, was not likely to belong to the typical *Phyllodoce coerulea*. Thus, it differs distinctly in having the flowers quite erect, not nodding during the flowering; the corolla is considerably shorter and wider, open-campanulate, not constricted at the throat, wide and open, the lobes rather large, subobtuse, being especially distinctly inclined backwards. Moreover, it is distinguished by having the style much projecting. These last characters may be seen especially distinctly in the intersected and magnified flower on the right hand side of the figure at the bottom.

This specimen, belonging to Komarow's collections from Kamtchatka, cannot be referred to the typical *Phyllodoce coerulea*, but seemed to be a subspecies, or perhaps still more probably a distinct species, precisely distinguished from the latter by the above-mentioned characters. However, as I have not seen these specimens myself, I dare not give a full description of it, based upon a single figure only, which may possibly be inaccurate at some points. I only wish hereby to draw attention to these circumstances.

Andromeda polifolia L. Spec. Pl. ed. II (1762) p. 564; Turczan. Cat. Baical. no. 756; Ledeb. Fl. Ross. II, p. 910; Turczan. Fl. Baical.-Dahur. (1848) p. 493, no. 742; Herder, Pl. Radd. (1872) p. 326, no. 30; Крыл. Фл. Алт. III (1904) p. 789; Е. Бушъ, *Ericaceae* въ Фл. Сибир. и Дальн. Вост. II (1915) p. 72; Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 48.

Scattered in peat-bogs, and the like, in the Amyl valley, at Ust Algiac, Ust Kamsara, and in the Altaian, where collected by me at altitudes of to about 2000 m. above sea-level, with young flowers at the end of July. The specimens agree perfectly with var. *typica* E. Busch, l. c.

Distribution: Northern and middle Europe, southwards to France, Switzerland, and Austro-Hungary, Siberia, northwards to the mouths of the rivers Yenisei, Lena, and Kolyma, the Tshuktsher Peninsula, Kamtchatka, northern Mongolia, Sakhalin, Japan, North America, Greenland.

Arctostaphylos alpina Spreng. System. Vegetal. II (1825—1828) p. 287; Turczan. Cat. Baical. no. 752; Ledeb. Fl. Ross. II, p. 908; Turczan. Fl. Baical.-Dahur. (1848) p. 491, no. 740; Herder, Pl. Radd. (1872) p. 323, no. 28; Крыл. Фл. Алт. II (1904) p. 788. *Arctous alpina* (L.) Niedenzu in Engl. Bot. Jahrb. XI (1889); Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 61.

Rather common in the Altaian, near the sources of the river Sisti-kem, at an altitude of about 2000 m. above sea-level, mostly on somewhat dry cliffs covered with mosses and lichens, where gathered by me with young fruits at the end of July.

Distribution: Arctic and alpine regions of Europe, northern Siberia, approximately between 65° and 72° north lat., eastwards to Kamtchatka, the Thian-Shan, the Altai and the Sayansk districts, northern Mongolia, Baikal, Trans Baikal, the Amoor Province, Sakhalin, Japan, North America.

Vaccinium Oxycoccos L. Spec. Pl. ed. II (1762) p. 500; Ledeb. Fl. Alt. II, p. 67; Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 64. *Oxycoccos palustris* Pers. Synops. Plant. I (1805) p. 419; Turczan. Cat. Baical. no. 761; Ledeb. Fl. Ross. II, p. 905; Turczan. Fl. Baical.-Dahur. (1848) p. 489, no. 739; Herder, Pl. Radd. (1812) p. 321, no. 26; Крыл. Фл. Алт. III (1904) p. 786.

Common in peat-bogs, and the like, in subalpine and alpine regions of the Sayansk district. I have collected and observed it in the following places: Kalna, Ust Algiac, in the Altaian up to the bare mountains, near Tshebertash, and near Utinski porog.

Besides the typical plant, *f. vulgare* A. Bl., there also commonly occur specimens of *f. microcarpum* Turczan. Both of these forms are frequently found growing together and — in point of morphology — they are not strictly separated, but connected together by intermediates. The species flowers in July. The specimens collected agree perfectly in structure with Scandinavian material of comparison.

Distribution: Northern and middle Europe, southwards to France, Switzerland and Austro-Hungary, Siberia, in the Yenisei valley northwards to 69° north lat., eastwards to Kamtchatka, northern Mongolia, the Amoor Province, Sakhalin, Japan, North America, Greenland.

Vaccinium Myrtillus L. Spec. Pl. ed. II (1762) p. 498; Ledeb. Fl. Alt. II, p. 66; Turczan. Cat. Baical. no. 758; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 574; Ledeb. Fl. Ross. II, p. 902; Turczan. Fl. Baical.-Dahur. (1848) p. 488, no. 737; Herder, Pl. Radd. (1872) p. 314, no. 19; Крыл. Фл. Алт. III (1904) p. 784; Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 67.

Common in the subalpine taiga along the rivers Amyl, Sisti-kem, and Bei-kem. In the Altaian found by me at an altitude of about 1800 m. above sea-level, flowering and in part past flowering at the end of July. The fruit ripens in subalpine regions at the end of July and the beginning of August.

Distribution: Europe, except the southern parts, Caucasia, the north of Asia Minor, Siberia, in the Yenisei valley northwards to 68° 35′ north lat., eastwards to Kamtchatka, northern Mongolia, North America.

Vaccinium uliginosum L. Spec. Pl. ed. II (1762) p. 499; Turczan. Cat. Baical. no. 759; Ledeb. Fl. Ross. II, p. 904; Turczan. Fl. Baical.-Dahur. (1848) p. 488, no. 738; Herder, Pl. Radd. (1872) p. 319, no. 25; Крыл. Фл. Алт. III (1904) p. 785; Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 70.

The specimens collected by me in various localities in the Sayansk district, differ distinctly from the Scandinavian ones in having the branches completely glabrous, and always destitute of the fine, short hairs covering the year's shoots in the typical plant. By an exact examination of what is to be found of Norwegian and foreign material of this species in the herbarium of the University at Christiania, I have found the pubescence on the year's shoots to be an absolutely unalterable character for European specimens of *Vaccinium uliginosum*. These completely glabrous specimens from eastern Siberia are separated by me as

subspec. **imberbe** nov. subspec.

Ramuli novelli semper omnino glabri, nitidi, nunquam ut in forma typica pubescentes; baccae breve stipitatae, pedunculi tantum 1—2 mm. longi; folia cum ceteris comparata angusta.

The specimens at hand are, besides, distinguished by having the pedicels very short, only one to a few mm. long, and the leaves frequently somewhat broader, more equally broad, rather suddenly narrowed towards the base. This one is rather frequently to be met with in the taiga territory, and is also very common in the Altaian, in turfy bogs, etc., near the limit of tree vegetation. The fruits ripen at end of July and the beginning of August. The typical species does not occur in my collections from the Sayansk district.

Distribution: The species is distributed in northern and middle Europe, southwards to middle Spain, middle Italy, Turkey, northern and middle Russia, Caucasia, Siberia, in

the Yenisei valley northwards to 71° 20′ north lat., eastwards to the Tshuktsher Peninsula, Kamtchatka and the Amoor Province, northern Mongolia, Sakhalin, Japan, North America, Greenland.

Vaccinium vitis idaea L. Spec. Pl. ed. II (1762) p. 500; Ledeb. Fl. Alt. II, p. 67; Turczan. Cat. Baical. no. 760; Ledeb. Fl. Ross. II, p. 901; Turczan. Fl. Baical.-Dahur. (1848) p. 487, no. 736; Herder, Pl. Radd. (1872) p. 312, no. 18; Крыл. Фл. Алт. III (1904) p. 783; Кузнецовъ, Бересковыя въ Федченко, Фл. Азіат. Россіи 9 (1916) p. 75.

Rather common in the Sayansk district, in coniferous forest. The specimens collected seemed, at least to judge from my material, generally to have the flowers somewhat smaller than the Scandinavian ones. The corolla is generally shorter, wider and more open; the length of the style in these specimens does not exceed 5 mm., while it is generally 7 mm. or sometimes still more in the Scandinavian ones. For the rest, the plants seemed not to differ from Scandinavian material. Of pretty common occurrence in rather dry situations about the Upper Amyl, on the Sisti-kem, and about the Kamsara. Taken in flower and partly past flowering about the middle of July.

In the Altaian, above the limit of trees, at an altitude of about 2000 m. above sea-level, I have collected specimens belonging to a very small form, only attaining a height of 2 to 3 cm. The leaves are broadly ovate to nearly orbicular, from 5 to 8 mm. long, nearly sessile. The flowers are also rather small, from 3 to 4 mm. long, and rather open. The raceme is few-flowered, only 2- or 3-flowered. The bracts are completely glabrous, wanting marginal hairs as well, which is partly also the case in the sepals. The pedicels are very short, only about 1 mm. long. The year's shoots are very short, only about 5 to 10 mm. long. To judge from the number of the year's shoots, these specimens may attain a pretty great age. I refer this form to *f. pumilum* Hornem., Lange, Consp. Fl. Groenl. p. 90 (*Vaccinium vitis idaea* var. *microphyllum* Herder, l. c.).

Distribution: Northern and middle Europe, southwards to France, northern Italy and northern Turkey, Russia, from the Arctic Ocean southwards to Kiev and Orenburg, Novaya Zemlya, Siberia, from the Ural to the Pacific Ocean, northern Mongolia, Manchooria, Sakhalin, Japan, North America, Greenland.

Primulaceae Vent.

Primula patens Turczan. in Bull. Soc. Natural. Moscou (1838) p. 99. *P. cortusoides* L. *β patens* Turczan. Fl. Baical.-Dahur. (1849) p. 291. *P. saxatilis* Komarow in Act. Hort. Petropol. XVIII (1901) p. 429; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 27.

The specimens which I refer to this one, are large and vigorous and distinguished by their comparatively short-petioled leaves, the petioles 4—9 cm. long, that is, once to twice as long as the blade. The shape of the blade is ovate, 4—6 cm. long, and 3,5—5,5 cm. broad, always distinctly, not unfrequently even deeply cordately indented at the base.

The margin of the leaf is slightly undulate, and on each side dissected into 6 broad, semiorbicular lobes, rounded at the top, each of them 5, rarely 3- or 7-toothed. The scape is considerably longer than the leaves, from 20—35 cm. long, pubescent, especially so at the base. The bracts are lanceolate, 6—7 mm. long, slightly nerved, with short, but rather dense hairs. The flowers are 4—10, on rather strict and slightly hairy pedicels, measuring about 2 cm. in length. The calyx is 5—8 mm. long, to about the middle cleft into lanceolate lobes, with scattered, short hairs, or at times nearly glabrous. The flowers are large, the limb 18—26 mm. in diameter; the petals rather deeply emarginate, reddish violet. The tube is about 1 cm. long, projecting considerably beyond the calyx, its colour rather varying, from a dark violet to a pallid yellowish green. With regards to the margins of the petals, the species exhibits the same features as the nearly allied *P. cortusoides* L., being either entire or serrulate. I therefore separte these respectively as *f. integerrima nov. f.: corollae lobi integri* and *f. denticulata nov. f.. corollae lobi denticulati.*

This species is rather common on the islets in the rivers Yenisei and Abakan, where occurring in grass-grown places, in thickets, etc., in full flower at the beginning of June. Specimens taken in different localities prove to be rather varying in pubescence, in the length of the scape, the length of the calyx-lobes, the shape of the limb and of the tube.

P. patens Turczan. is undoubtedly very nearly allied to *P. cortusoides* L., and I am inclined to look upon it as an eastern subspecies of the latter. Their geographical distribution also seemed to be indicative of this assumption being right. My specimens, collected in the transition zone between the geographical areas of the two said species, thus seemed, in many respects, to constitute intermediates between them.

Distribution: *Primula patens* occurs in eastern Asia, westwards to about the Altai region. In western Siberia it is replaced by *Primula cortusoides* L.

Primula officinalis (L.) Hill, Vegetable Syst. VIII (1765) p. 25; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 56; Крыл. Фл. Алт. III (1904) p. 808.

var. **macrocalyx** (Bunge) C. Kock in Linnaea XVII (1843) p. 307; Pax et Knuth, l. c. p. 58. *P. macrocalyx* Bunge in Ledeb. Fl. Alt. I, p. 209; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 712. *P. officinalis* var. *inflata* Ledeb. Fl. Ross. III, p. 8; Herder, Pl. Radd. (1872) p. 385, no. 75.

About Karatus and Kushabar, on hills and in small thickets. Past flowering at the beginning of July.

Distribution: The variety is distributed from eastern Prussia, eastwards through the south-eastern portion of middle Europe, Caucasia and south-western Asia, southern Siberia, eastwards to the government of Yeniseisk.

Primula elatior (L.) Hill, Vegetable Syst. XIII (1765) p. 25; Ledeb. Fl. Ross. III, p. 9; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 49; Крыл. Фл. Алт. III (1904) p. 809.

var. **Pallasii** (Lehm.) Pax in Engl. Bot. Jahrb. X (1889) p. 179; Pax et Knuth, l. c. (1905) p. 51; Крыл. l. c. (1904) p. 809. *P. altaica* Pall. ex Ledeb. Fl. Alt. I, p. 20.

This eastern variety of the species is distinguished from the typical plant by having the leaves less rugose, thinner, and tapering into the petiole. The stem, the calyx, and the under sides of the leaves are covered with very short, soft glandular hairs. The limb of the corolla is flat. The variety is of rather common occurrence in the Sayansk district, in alpine and subalpine meadows, and in thickets. All the specimens in my collections are distinguished by being few-flowered, each scape bearing only 3—6 flowers, thus agreeing perfectly with LEHMANN'S record in Monogr. Gener. *Primular.* (1817) p. 38. LEDEBOUR, however, expresses himself in the following way concerning this species: „Umbella multiflora: floribus non raro 15 (neque, ut vult cl. Lehm. l. c. 3—6)." The calyx-lobes are slightly, but not distinctly recurved, and of the same length as the ripe capsules. KORSHINSKY records the ripe capsules to be slightly shorter than the calyx. (Tent. Fl. Ross. p. 284 in Mem. Acad. Imp. Sc. St. Petersbourg, 1898, Vol. VII). Specimens collected at the end of July are mostly past flowering, not unfrequently with the ripe capsules already emptied.

Distribution: The above variety is distributed in the Ural, south-western Asia, the Altai, the Sayansk district (northern Mongolia).

Primula nivalis Pallas, Reise Russ. Reich. III (1772—73) p. 723; Ledeb. Fl. Alt. I, p. 210; Bunge, Enum. Alt. p. 9; Turczan. Cat. Baical. no. 921; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 713; Ledeb. Fl. Ross. III, p. 10 ex parte; Turczan. Fl. Baical.-Dahur. (1849) p. 292, no. 760; Herder, Pl. Radd. (1872) p. 388, no. 76; Крыл. Фл. Алт. III (1904) p. 810; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 102.

The specimens of this rather polymorphic plant are especially distinguished by the rather thick scape, at times drooping, only slightly projecting beyond the leaves, and bearing only 2—3 flowers — at least during the flowering — on rather short pedicels, only from 5—10 mm. long. The bracts are very narrow and acutish, nearly linear, 5—8 mm. long. The calyx is completely glabrous, about 6—7 mm. long, of an almost coal black colour (at any rate when dried), and about to the middle split into lobes, slightly acuminate at the top. The tube is about twice as long as the calyx, the limb about 1,5 cm. in diameter, of a dark purple hue. The whole plant is completely glabrous, and not mealy. The leaves are 1—2 cm., generally 1,5 cm. broad, and 5—8 cm. long, rather argute serrulate at the margin, gradually tapering and decurrent into the petiole. The specimens found are very nearly allied to the variety *typica* REGEL in Acta Hort. Petropol. III (1874) p. 135, which are recorded, however, to have mostly broader leaves, and the calyx of a greenish purple colour, with considerably longer lobes.

Distribution: The species is distributed in northern Asia Minor (the Pontus Mountains) and south-western Asia to the Himalayas, the Altai, the Sayansk district, the Yablonoi, Kamtchatka, China, North America (?). Var. *typica* REGEL occurs in the Altai and the Sayansk districts (northern Mongolia).

Primula farinosa L. Spec. Pl. ed. II (1762) p. 205; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1903) p. 82; Turczan. Cat. Baical. no. 919; Ledeb. Fl. Ross. III, p. 13; Turczan. Fl. Baical.-Dahur. (1849) p. 295, no. 763; Herder, Pl. Radd. (1872) p. 390, no. 77.

subspec. **eufarinosa** Pax *var.* **genuina** Pax in Engl. Bot. Jahrb. X (1889) p. 199; Pax et Knuth, l. c. (1905) p. 83.

Rather common in grassy places on the islets in the rivers Yenisei and Abakan, where collected by me in full flower at the beginning of June. The specimens are very large and well-grown, to 30 cm. high, the calyx-lobes comparatively short, only from 1/3 to 1/6 of the length of the calyx, subacutish at the top. The tube is of a deep yellow colour, projecting 1—1,5 mm. beyond the calyx. The petiole, the under side of the leaves, the bracts, the pedicels, and the calyx are densely mealy, of a yellowish green.

Fig. 97. *Primula nivalis* Pallas (1/1).

Distribution: Over the greater part of Europe, southern Siberia, in the Altai and Baikal regions, northern Mongolia, North America.

Primula longiscapa Ledeb. in Mem. Acad. St. Petersbourg V (1815) p. 520; Ledeb. Fl. Alt. I, p. 212; Bunge, Enum. Alt. p. 10; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 715; Ledeb. Fl. Ross. III, p. 12; Крыл. Фл. Алт. III (1904) p. 812. *P. farinosa* var. *denudata* Ledeb. Fl. Ross. III, p. 13; Herder, Pl. Radd. (1872) p. 392. *P. farinosa* subspec. *davurica* (Spreng.) Pax var. *intermedia* (Sims) Pax in Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 86. *P. altaica* β Turczan Fl. Baical.-Dahur. (1849) p. 294, no. 762. *P. exaltata* Lehm., Turczan. Cat. Baical. no. 920.

F. pedicellis calycibusque farinosis.

The leaves in the specimens collected vary rather much. The common shape is oblong to spatulate-lanceolate, 5—8 cm. long, 1,2—2 cm. broad, with a subobtuse or subacute apex. The margin is mostly entire or only slightly serrulate. The scape is from 30—45 cm. high, from 5—7 times as long as the leaves. The flowers numerous, 20—

30, on short pedicels, 0,5—0,8 cm. long. The bracts are linear to lanceolate, 3—5 mm. long, with acute apices. The calyx is about 4 mm. long, its upper third split into triangular lobes, subacute or subobtuse at the top. The tube is generally of a yellow colour, mostly projecting 1 mm., rarely more, beyond the calyx. The limb is from 6—7 mm. in diameter, of a pale violet, gradually darker towards the throat, or through every shade of colour to a nearly shining white. KRYLOW (Фл. Алт. III, p. 807 and p. 812) records the whole plant as completely glabrous, not mealy. In the specimens at hand I have found, however, the pedicels and the calyx always to be markedly mealy, also the bracts and even the upper part of the stem generally more or less distinctly mealy, of a whitish hue. The young scapes, as yet only one inch high, are completely white-mealy. On the other hand, the leaves seemed always to be glabrous, at any rate when full-grown.

Occurring on the Abakan Steppe, near Ust Kamuishto, in grass-grown, clayey, mostly saline soil, accompanying *Ranunculus plantaginifolius, Lepidium cordatum, Lepidium crassifolium, Plantago maritima* subspec. *ciliata*, and other halophilous plants. In full flower in the second half of June.

Distribution: South-eastern Russia, Caucasia, Turkestan, the Thian-Shan, southern Siberia, northern Mongolia.

Primula sibirica Jacq. Misc. Austr. I (1778) p. 161; Ledeb. Fl. Alt. I, p. 213; Ledeb. Fl. Ross. III, p. 14; Turczan. Fl. Baical.-Dahur. (1849) p. 293, no. 761; Herder, Pl. Radd. (1872) p. 395, no. 78; Крыл. Фл. Алт. III (1904) p. 812; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 76.

var. **brevicalyx** Trautv. Plant. Imag. Fl. Ross. (1844—46) p. 44; Ledeb. Fl. Ross. III, p. 14; Pax et Knuth, l. c. (1905) p. 77.

The specimens collected are distinguished by comparatively long petioles, about twice the length of the blade, the margin of which is entire. The calyx is 5—8 mm. long, its upper third or fourth cleft into rather blunt lobes, rather densely ciliate. The length of the pedicels is much varying, 0,5—3 cm., the number of the flowers 1—3, mostly 2. The tube is yellowish green, 10—11 mm. long, from one third to twice as long as the calyx. The limb is 12—14 mm. in diameter. In full flower about the middle of June.

The plant is of rather common occurrence on the Abakan Steppe, near Askys, where growing in moist, grass-grown cavities on the steppe, near the river, associated with plants such as *Carex capillaris, Orchis* spec. div., *Cypripedilum macranthum, Herminium Monorchis, Trollius asiaticus, Comarum palustre*, etc.

Distribution: The main species is distributed over the arctic regions of Europe, Asia and America, as well as on Greenland, and the mountain regions of central Asia. The variety *brevicalyx* occurs only in central Asia, from the Hindoo-Koosh to the north-western Himalayas, the Altai and Sayansk districts, Baikal, Trans Baikal, to China (Kan-su).

Adrosace villosa L. Spec. Pl. ed. II (1762) p. 203; Ledeb. Fl. Alt. I, p. 217; Turczan. Cat. Baical. no. 927; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 719; Ledeb. Fl. Ross. III, p. 17;

Turczan. Fl. Baical. Dahur. (1849) p. 297, no.764; Herder, Pl. Radd. (1872) p. 398, no. 83; Крыл. Фл. Алт. III (1904) p. 814; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 190.

var. **dasyphylla** (Bunge) Karel. et Kiril. in Bull. Soc. Natural. Moscou XV (1842) p. 249; Pax et Knuth, l. c. (1905) p. 192. *A. dasyphylla* Bunge in Ledeb. Fl. Alt. I, p. 218; Ledeb. Fl. Ross. III, p. 17; Крыл. l. c. (1904) p. 815.

Number of flowers 1 or 2, on scapes 1—1,5 cm. high. The flowers 0,5—0,8 cm. in diameter. The whole plant is rather densely hairy, and the scape also furnished with scattered, glandular hairs. The specimens belong to *f. genuina* R Knuth, l. c. p. 193. Taken on dry, stony declivities on the steppe, near Karatus. Most of the specimens with ripe capsules, some in flower in the first half of July.

Distribution: The variety *dasyphylla* is distributed in the Pyrenees, Asia Minor, Caucasia and south-western Asia to Afghanistan and Pamir, southern Siberia, northern Mongolia.

Fig. 98. *Androsace villosa* L. var. *dasyphylla* (Bunge) Karel. et Kiril. (1/1).

Androsace septentrionalis L. Spec. Pl. ed. II (1762) p. 203; Ledeb. Fl. Alt. I, p. 215; Turczan. Cat. Baical. no. 924; Ledeb. Fl. Ross. III, p. 19; Turczan. Fl. Baical.-Dahur. (1849) p. 300, no. 767; Herder, Pl. Radd. (1872) p. 402, no. 84; Крыл. Фл. Алт. III (1904) p. 816; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 214.

var. **typica** Knuth, l. c. (1905) p. 215.

Agrees rather perfectly with Scandinavian specimens. The scapes, howewer, are as a rule numerous, generally 2—4, only very rarely solitary; the petals also generally project about 1 mm. above the calyx. Scattered in dry, sandy meadows on islets in the rivers Yenisei and Abakan, and on the steppes about Minusinsk. In full flower and in part past flowering in June and July. In the Urjankai country I have found the species in dry, sandy woods, near Ust Sisti-kem.

Distribution: Europe, northwards to about 63° north lat., temperate and northern Asia (northwards, at Taimur, to 74° north lat., southwards to Tibet and Cashmere, eastwards to Kamtchatka and the Amoor Province), North America.

Androsace filiformis Retz. Observ. Bot. II (1781) p. 10; Ledeb. Fl. Alt. I, p. 216; Turczan. Cat. Baical. no. 926; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 718; Ledeb. Fl. Ross. III, p. 21; Turczan. Fl. Baical.-Dahur. (1849) p. 301, no. 768; Herder, Pl. Radd. (1872) p. 406, no. 87; Крыл. Фл. Алт. III (1904) p. 819; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 217.

var. **glandulosa** Krylow, Матер. къ Фл. Пермск. Губ. II, с. 174; Крыл. l. c. (1904) p. 820.

On the road between Karatus and Kushabar, frequently in somewhat moist places, and in the subalpine taiga on the river Amyl. Nearly done flowering in the middle of July.

Distribution: Middle and eastern Russia, Siberia, eastwards as far as the Tshuktsher Peninsula and Kamtchatka, in the Yenisei valley northwards to 69° 25′ north lat., northern Mongolia, eastern Asia, western part of North America.

Androsace maxima L. Spec. Pl. ed. II (1762) p. 203; Ledeb. Fl. Alt. I, p. 214; Turczan. Cat. Baical. no. 922; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 716; Ledeb. Fl. Ross. III, p. 20; Turczan. Fl. Baical.-Dahur. (1849) p. 302, no. 770; Herder, Pl. Radd. (1872) p. 405, no. 86; Крыл. Фл. Алт. III (1904) p. 818; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 212.

The specimens collected are small, with the solitary scape 1—2, rarely to 3 cm. high. The bracts of the involucre 3—7 mm. long, entire, as a rule somewhat longer than the pedicels.

Scattered on dry, stony declivities on the steppe about the rivers Yenisei and Abakan. Most of the specimens already done flowering at the beginning of June, only some few with flowers of a light red. The capsule is of about the same size as the calyx, rarely projecting.

Distribution: Middle and southern Europe, North Africa, Caucasia, Siberia, eastwards to Trans Baikal, northern Mongolia.

Androsace Gmelini (Lam.) Gaertn., De Fruct. et Sem. Pl. I (1788) p. 232; Ledeb. Fl. Alt. I, p. 217; Turczan. Cat. Baical. no. 928; Ledeb. Fl. Ross. III, p. 21; Turczan. Fl. Baical.-Dahur. (1849) p. 301, no. 769; Herder, Pl. Radd. (1872) p. 407, no. 88; Крыл. Фл. Алт. III (1904) p. 820; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 179.

This nice little plant is of rather common occurrence on the islets in the rivers Yenisei and Abakan, especially in somewhat moist meadows, where taken by me in full flower, and partly with ripe fruits, in the second half of June. The leaves are generally about 1 cm. or somewhat more in diameter.

Distribution: From the central and eastern Altai, through the southern portions of the governments of Yeniseisk, Irkutsk, Trans Baikal, western Manchooria, and western China.

Cortusa Matthioli L. Spec. Pl. ed. II (1762) p. 206; Ledeb. Fl. Alt. I, p. 206; Turczan. Cat. Baical. no. 915; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 710; Ledeb. Fl. Ross. III, p. 22; Turczan. Fl. Baical.-Dahur. (1849) p. 303, no. 771; Herder, Pl. Radd. (1872) p. 408, no. 89; Крыл. Фл. Алт. III (1904) p. 821; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 221.

The leaves are orbicular-reniform, 5—6 cm. wide, cordate at the base and characteristic in having the lobes rather deeply and sharply serrate. The petioles are 5—9 cm. long, and, like the veins on the under side of the leaves, distinctly winged. The specimens are glabrous, some, however, having a few, scattered hairs along the veins on the under side of the leaf; the upper side is always completely glabrous. The scape is of about the same height as the leaves. The bracts are ovate to lanceolate, always distinctly and in part

rather deeply and sharply serrate. The pedicels are 1,5—2 cm. long, now and then somewhat drooping. The plants are always comparatively few-flowered, only with 2—5 flowers. The calyx is 5—6 mm. long, to about the middle split into narrowly triangular lobes, pointed at the top. The petals are large, 12—14 mm. long.

Fig. 99. *Androsace Gmelini* (LAM.) GAERTN. (1/1).

Of rather frequent occurrence in the Altaian, in mossy, shady places, along mountain rivulets, etc., in the subalpine region, near the tree limit. I full flower at the end of July.

Distribution: Alpine regions of middle Europe, northern Russia, Novaya Zemlya,

Siberia, in the Yenisei valley northwards to 72° 25′ north lat., and eastwards to the Sea of Okhotsk, the Altai and Sayansk districts, Trans Baikal to China, Sakhalin, Japan, south-western Asia to the Himalayas.

Trientalis europaea L. Spec. Pl. ed. II (1762) p. 488; Turczan. Cat. Baical. no. 930; Ledeb. Fl. Ross. III, p. 24; Turczan. Fl. Baical.-Dahur. (1849) p. 305, no. 773; Herder, Pl. Radd. (1872) p. 413, no. 93; Крыл. Фл. Алт. III (1904) p. 823; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 313.

Fig. 100. Leaf of *Cortusa Matthioli* L. from the Sayansk mountains (1/1).

Pretty common in shady woods of conifers about the Upper Amyl, on the Sisti-kem, at Ust Kamsara, and in the Altaian, where collected by me to far above the tree limit, to about 2000 m. above sea-level. All of the specimens belong to the typical form. In full flower in July.

Distribution: Widely distributed over the northern and temperate regions of Eurasia. Geographical range in Scandinavia northwards to 71° 10′ north lat., in the Ural to about 67½° north lat., in western Siberia to about 64° north lat., in the Yenisei valley to about 66° 30′ north lat., and eastwards as far as the Tshuktsher Peninsula and Kamtchatka, northern Mongolia, Sakhalin, Japan, North America.

Lysimachia vulgaris L. Spec. Pl. ed. II (1762) p. 209; Ledeb. Fl. Alt. I, p. 207; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 711; Ledeb. Fl. Ross. III, p. 27; Herder, Pl. Radd. (1872) p. 417, no. 96; Крыл. Фл. Алт. III (1904) p. 825; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 303.

var. **typica** R. Knuth, l. c. (1905) p. 304.

In humid places on the river Abakan, and scattered in the tracts between Karatus and Kushabar, at Petropawlowsk on the Amyl, Semiretska and Kalna, where it begins flowering at the beginning of July.

The leaves in this variety are generally verticillate in 3's, only in the upper part of the stem and in the panicle sometimes opposite. The leaves are large and broad, ovate to

ovate-lanceolate, frequently broadest in the lower half; the base is rounded or at times nearly cordate, not narrowed, the apex acute or acuminate. They are usually destitute of petioles, completely sessile, and distinguished by being comparatively more markedly black-punctate than is common in the Scandinavian specimens with which I have compared them. The leaves are to 3,5 cm. broad, and to 8 cm. long; the margin is plane or rarely slightly revolute, entire or slightly and irregularly crenulate. There seemed to occur intermediates between this variety and the following one.

var. **davurica** (Ledeb.) R. Knuth, l. c. (1905) p. 304. *L. davurica* Ledeb. in Mem. Acad. Petersbourg V (1814) p. 523; Ledeb. Fl. Alt. I, p. 207 in nota; Turczan. Cat. Baical. no. 916; Ledeb. Fl. Ross. III, p. 27; Turczan. Fl. Baical.-Dahur. (1849) p. 307, no. 775; Herder, Pl. Radd. (1872) p. 416, no. 95.

This variety, being distinguished by its more narrowly lanceolate leaves, generally only 2 opposite ones, I have gathered on the islets in the Lower Abakan, and in the Urjankai country, on the Sisti-kem. The shape and size of the leaves are somewhat varying. The lower ones are narrowest, very narrowly lanceolate, only from 5—6 mm. broad, and 5 or 7 times as long, broadest at the base, tapering towards the apex. The upper ones gradually become broader, the uppermost broadly lanceolate, and, moreover, frequently also being verticillate in 3's. All the leaves are sessile; their margin is slightly undulate and revolute. The lower stem-leaves are gradually reduced downwards to scales. The specimens collected are mostly more hirsute than the preceding one, especially so in the upper parts of the plant, and on the under side of the leaves. In the structure of the flowers both varieties seemed to agree, but the latter always seemed to have 3 rather distinct nerves on the sepals, the former, according to my material, wanting distinct nerves. The universality of this character, however, cannot be definitely settled on account of the scarcity of my material. The pedicels in both varieties, are, during the flowering season, of about double the length of the calyces. The variety *davurica* seemed, for the rest, not to be strictly distinguished from the variety *typica*, but connected with intermediates.

Distribution: Europe, except the most northern and southern parts, Caucasia, Asia Minor, south-western Asia and Turkestan, Siberia, in the government of Tobolsk, northwards to 62° 10′ north lat., and in the government of Yeniseisk to 60° 10′ north lat., eastern Asia, India, North Africa. The variety *davurica* especially occurs in the eastern geographical area of the species, from south-eastern Europe, through the Altai region, the Sayansk district, Baikal, Manchooria, to China and Japan.

Lysimachia thyrsiflora L. Spec. Pl. ed. II (1762) p. 209; Ledeb. Fl. Alt. I, p. 207; Turczan. Cat. Baical. no. 917; Turczan. Fl. Baical.-Dahur. (1849) p. 306, no. 974; Herder, Pl. Radd. (1872) p. 418, no. 97; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 302. *Naumburgia thyrsiflora* (L.) Duby in DC. Prodrom. VIII (1844) p. 60; Ledeb. Fl. Ross. III, p. 25; Крыл. Фл. Алт. III (1904) p. 824.

The specimens collected are nearly completely glabrous, wanting the rusty-red, curly hairs generally to be found in Norwegian specimens. The raceme is comparative-

ly short, nearly ovoid, and very densely flowered; the leaves are comparatively long, equally narrow, to 12 cm. long, and 1,7 cm. broad. Of rather common occurrence in swampy places, in still creeks, etc., along the rivers Abakan and Yenisei, near the Kamsara, and on flood-plains at Ust Tara-kem. The species begins flowering in the first half of June.

Distribution: Temperate regions of Europe, Siberia, northwards to 62° 10′ north lat. in the government of Tobolsk, and to 66° 30′ in the government of Yeniseisk, eastwards to Kamtchatka, northern Mongolia, Manchooria, Sakhalin, Japan, North America.

Glaux maritima L. Spec. Pl. ed. II (1762) p. 301; Ledeb. Fl. Alt. I, p. 274; Turczan. Cat. Baical. no. 929; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 720; Ledeb. Fl. Ross. III, p. 23; Turczan. Fl. Baical.-Dahur. (1849) p. 304, no. 772; Herder, Pl. Radd. (1872) p. 411, no. 92; Крыл. Фл. Алт. III (1904) p. 822; Pax et Knuth, *Primulac.* in Engl. Pflanzenr. H. 22 (IV, 237, 1905) p. 319.

subspec. **pedunculata** *nov. subspec.* [Tab. XIV, Fig. 2].

Ab forma typica differt floribus distincte stipitatis — pedunculi 1—2,5 mm. longi; capsulae fere pyriformes, apice protactae, acuminatae, nec globosae, maturae 3—4 mm. longae.

The specimens collected by me in southern Siberia, are generally of a rather slender growth, 18—20 cm. high, usually simple, more rarely branched, strict, sometimes decumbent, according to the habitats. The leaves are comparatively narrow, nearly lanceolate, 10—12 mm. long, and the breadth from ⅓—¼ of the length, generally with a short petiole, and furnished with a rather indistinct midvein. These specimens, however, are especially characteristic and differing in having the flowers pedicelled, usually comparatively long-pedicelled. The pedicels are generally 1—2 mm. long; specimens with pedicels measuring even to 2,5 mm. have been observed by me. The pedicel is, like the whole plant, glabrous, more or less striate. The length of the flowers is generally from 2,5—3,5 mm., not differing from the typical species. The stamens are of about the same length as the calyx. The capsule, however, is characteristic in having the top distinctly protruding, so as to give it a pyriform appearance; the length of the fruit is 3 to 4 mm.

In the floras in most common use, this species is recorded to have sessile or nearly sessile flowers, as is also the case in the work by Pax et Knuth, quoted above, where is recorded: „Flores sessiles"; the fruits are, moreover, reported to be globular, both of which characters also seemed to agree with the material of this species taken from various parts of the globe, and used by me for comparison. In Крыловъ, Фл. Алтая III (1904) p. 822, however, the flowers are recorded to have short pedicels, and the fruits to be globular, with protruding tops, a statement accordingly agreeing with my observations. It is therefore just possible that the subspecies *pedunculata* is widely distributed over Siberia, where forming an eastern race of the species *Glaux maritima*.

Occurring on the Abakan Steppe, at Ust Kamuishto, on the borders of salt marshes, and in saliferous soil, where it is very common, accompanying *Scirpus maritimus*, *Suaeda maritima*, *Triglochin maritima*, *Juncus Gerardi*, *Ranunculus plantaginifolius*, *Lepidium*

Fig. 101. *Glaux maritima* L. subspec. *pedunculata* nov. subspec. a. and b. Parts of stems, respectively with flowers and capsules. — c. Capsule with the pedicel (3,5/1).

crassifolium, and other halophilous plants. In flower and with ripe fruits in the second half of June.

Distribution: Europe, except the extreme north, southwards to northern Spain and northern Italy, Caucasia, and south-western Asia to Dzungaria, Turkestan, Afghanistan, western Tibet, Pamir, southern Siberia, from the Ural to the Pacific Ocean, northern Mongolia, eastern Asia to northern China, Sakhalin, Japan, North America.

Plumbaginaceae LINDL.

Statice speciosa L. Spec. Pl. ed. II (1762) p. 395; Ledeb. Fl. Alt. I, p. 436; Turczan. Cat. Baical. no. 934; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 727; Ledeb. Fl. Ross. III, p. 465; Крыл. Фл. Алт. IV (1907) p. 1077. *Goniolimon speciosum* Boiss. in DC. Prodrom. XII, p. 634; Turczan. Fl. Baical.-Dahur. (1852) p. 394, no. 926; Herder, Pl. Radd. (1887) p. 49, no. 603.

var. **genuina** Krylow, l. c. (1907) p. 1078.

Scattered in dry, stony field, on dry rocks, etc., on the Abakan Steppe, where flowering in June. I have also collected it in the Urjankai country, on dry sunny declivities on the Bei-kem, near Ust Sisti-kem, and in several places on the steppes between the Tapsa and Kemchik-bom.

Distribution: South-eastern Russia, Turkestan, Siberia, eastwards roughly to Irkutsk, northern Mongolia.

Statice Gmelini Willd. Spec. Pl. ed. II, p. 1524; Ledeb. Fl. Alt. I, p. 432; Turczan. Cat. Baical. no. 236; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 723; Ledeb. Fl. Ross. III, p. 460; Turczan. Fl. Baical.-Dahur. (1852) p. 397, no. 929; Herder, Pl. Radd. (1887) p. 52, no. 606; Крыл. Фл. Алт. IV (1907) p. 1076.

On the steppes along the Ulu-kem, especially in somewhat saliferous soil.

Distribution: Middle and southern Europe from Hungary and eastwards, Caucasia, south-western Asia to Turkestan, southern Siberia, eastwards to Lake Baikal, northern Mongolia.

Gentianaceae DUMORT.

Gentiana Amarella L. Spec. Pl. ed. II (1762) p. 334; Ledeb. Fl. Ross. III, p. 52; Turczan. Fl. Baical.-Dahur. (1849) p. 316, no. 778; Herder, Pl. Radd. (1872) p. 427, no. 109; Крыл. Фл. Алт. III (1904) p. 835. *G. pratensis* Froel., Ledeb. Fl. Alt. I, p. 288; Turczan. Cat. Baical. no. 785; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 588.

In dry meadows, and in light, open larch forest on the Sisti-kem, near Tshebertash, at Ust Kamsara, and Ust Tara-kem. In flower in the first half of August.

Distribution: Europe, southwards roughly to the north of France, Switzerland, Austria, northern Italy and Bulgaria, the Caucasus, Siberia, in the Yenisei valley northwards to towards 66° north lat., and eastwards to Kamtchatka, northern Mongolia, North America.

Gentiana detonsa Rottb. Act. Hafn. X (1770) p. 254; Ledeb. Fl. Ross. III. p. 59; Turczan. Fl. Baical.-Dahur. (1849) p. 322, no. 787; Herder, Pl. Radd. (1872) p. 439, no. 116. *G. barbata* Froel. *Gentiana* Libell. (1796) p. 114; Ledeb. Fl. Alt. I, p. 282; Turczan. Cat. Baical. no. 780; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 581; Turczan. l. c. p. 321, no. 783; Ledeb. Fl. Ross. III, p. 59; Крыл. Фл. Алт. III (1904) p. 841.

Pretty common in the tracts about the Lower Sisti-kem, roughly from Tshebertash, and downwards, where occurring near the river-banks, in woods and in grass-grown places. At Ust Sisti-kem, it is exceedingly frequent in the meadows, where — together with *Sanguisorba officinalis* — constituting one of the most characteristic plants. Collected flowering nearly throughout August. I have also observed it scattered along the banks of the Bei-kem, from Ust Tara-kem to Ust Kamsara.

Distribution: Eastern Russia, Siberia, in the Yenisei valley northwards to 69° north lat., and eastwards to the Amoor Province and northern China, the Thian-Shan, Pamir, northern Mongolia, North America?

Gentiana algida Pallas, Fl. Ross. II, p. 107; Ledeb. Fl. Alt. I, p. 281; Turczan. Cat. Baical. no. 767; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 578; Turczan. Fl. Baical.-Dahur. (1849) p. 330, no. 792; Крыл. Фл. Алт. III (1904) p. 845. *G. algida* Pallas *α sibirica* Kusnezow, Subgen. *Eugentiana* in Act. Hort. Petropol. XV (1896—1904) no. 53. *G. frigida* Haencke *γ algida* (Pallas) Ledeb. Fl. Ross. III, p. 65; Herder, Pl. Radd. (1872) p. 453, no. 125.

Rather common in the Altaian, at an altitude of 1700—2000 m. above sea-level, in places covered with moss and lichen, together with *Gentiana altaica, Phyllodoce coerulea, Dryas octopetala, Saxifraga comosa, Rhododendron chrysantum*, and others. Collected in full flower at the end of July.

Distribution: Alpine tracts of middle Europe, Siberia, through the Altai and Sayansk regions and Trans Baikal to the Tshuktsher Peninsula and Kamtchatka, Dzungaria, the Thian-Shan, Mongolia, Tibet, the Himalayas, Cashmere, Japan, North America.

Gentiana macrophylla Pallas, Fl. Ross. II, p. 108; Ledeb. Fl. Alt. I, p. 286; Turczan. Cat. Baical. no. 766; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 587; Ledeb. Fl. Ross. III, p. 69; Kusnez. *Eugent.* no. 92; Turczan. Fl. Baical.-Dahur. (1849) p. 333, no. 795; Herder, Pl. Radd. (1872) p. 461, no. 132; Крыл. Фл. Алт. III (1904) p. 847.

In dry steppe meadows, and in open, dry brush-wood of birch and other foliage trees about Karatus and Kushabar. Collected with young flower-buds in the first half of July.

Distribution: Dzungaria, Siberia, in the Yenisei valley northwards to about 60° north lat., through the Altai and Sayansk regions, Trans Baikal, and eastwards to the Amoor Province, Manchooria, northern Mongolia, northern China.

Gentiana decumbens L. Suppl. p. 174; Ledeb. Fl. Alt. I, p. 280; Turczan. Cat. Baical. no. 773; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 577; Ledeb. Fl. Ross. III, p. 64; Turczan. Fl. Baical.-Dahur. (1849) p. 329, no. 791; Herder,Pl. Radd. (1842) p. 451, no. 124; Kusnez. *Eugent.* no. 78; Крыл. Фл. Алт. III (1904) p. 848.

On rocky slopes at Ust Tara-kem; flowering and past flowering in the middle of August.

Distribution: On the Upper Ural, southern Siberia, eastwards to Manchooria, northern Mongolia.

Gentiana altaica Pallas, Fl. Ross. II, p. 109; Ledeb. Fl. Alt. I, p. 283; Turczan. Cat. Baical. no. 774; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 583; Ledeb. Fl. Ross. III, p. 61; Turczan. Fl. Baical.-Dahur. (1849) p. 325, no. 786; Herder, Pl. Radd. (1872) p. 444, no. 118; Kusnez. *Eugent.* no. 100; Крыл. Фл. Алт. III (1904) p. 849.

Rather frequent in the Altaian, at an altitude of 1700—2000 m. above sea-level, among mosses and lichens, generally on dry and warm declivities facing south. In full flower at the end of July. The flowers in the specimens collected are of an azure colour.

Distribution: Through the Altai and Sayansk regions to the western part af Trans Baikal, northern Mongolia.

Gentiana humilis Steven in Mem. Soc. Nat. Moscou III, p. 258; Ledeb. Fl. Alt. I, p. 285; Turczan. Cat. Baical. no. 777; Ledeb. Fl. Ross. III, p. 63; Turczan. Fl. Baical.-Dahur. (1849) p. 327, no. 786; Herder, Pl. Radd. (1872) p. 448, no. 121; Kusnez. *Eugent.* no. 112; Крыл. Фл. Алт. III (1904) p. 851.

This pretty, little *Gentiana* is scattered on the islets in the rivers Yenisei and Abakan, where occurring in grass-grown places. Specimens taken at the beginning of June bear fully opened flowers, specimens collected in the second half of the same month are nearly past flowering, most of them with ripe, partly emptied capsules already.

Distribution: Caucasia, Asia Minor, and south-western Asia, southern Siberia, northern Mongolia, north-eastern Tibet, northern China, North America.

Gentiana squarrosa Ledeb. Fl. Alt. I, p. 285; Ledeb. Fl. Ross. III, p. 64; Turczan. Fl. Baical.-Dahur. (1849) p. 328, no. 790; Herder, Pl. Radd. (1872) p. 449, no. 122; Kusnez. *Eugent.* no. 138; Крыл. Фл. Алт. III (1904) p. 853.

In the territory explored this species is of about the same distribution as the preceding one, together with which it also sometimes occurs; it seemed, for the rest, to prefer somewhat drier localities. To judge from the material collected, it is somewhat rarer, and its flowering season also seemed to begin a little later than in the preceding species. On islets in the Yenisei, near Ust Abakansk.

Distribution: Russian Turkestan, southern Siberia, in the Yenisei valley northwards to about 59° north lat., and eastwards to the Amoor Province, Manchooria, Mongolia, western Tibet, northern India, Corea, China, Japan.

Gentiana verna L. Spec. Pl. ed. II (1762) p. 331.

var. **angulosa** Wahlenb., Kusnez. *Eugent.* no. 154; Крыл. Фл. Алт. III (1904) p. 855. *G. verna β alata* Griseb., Ledeb. Fl. Ross. III, p. 61; Herder, Pl. Radd. (1872) p. 441, no. 117. *G. angulosa* Marsch-Bieb., Ledeb. Fl. Alt. I, p. 283; Turczan. Cat. Baical. no. 775; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 582; Turczan. Fl. Baical.-Dahur. (1849) p. 323, no. 785.

In humid, grass-grown places in the taiga on the Upper Sisti-kem; flowering and past flowering at the end of July.

Distribution: Middle Europe, Caucasia and south-western Asia, southern Siberia to about Yakutsk, northern Mongolia.

Pleurogyne rotata (L.) Griseb. *Gentian.* (1839) p. 309; Ledeb. Fl. Ross. III, p. 71; Turczan. Fl. Baical.-Dahur. (1849) p. 334, no. 796; Herder, Pl. Radd. (1872) p. 463, no. 134; Крыл. Фл. Алт. III (1904) p. 856. *G. sulcata* Willd., Ledeb. Fl. Alt. I, p. 290; Turczan. Cat. Baical. no. 169. *Swertia rotata* L. Spec. Pl. ed. II (1762) p. 328.

In meadows near Tagarski osero, and in the Urjankai country, rather common about the Upper Bei-kem, near the Dora Steppe, the Kuree, and at Ust Tara-kem, where I have collected it in grassy, sometimes slightly moist places in brush-wood, etc., in full flower in August.

Distribution: North-eastern Europe, Siberia to Kamtchatka and the Amoor Province, northern Mongolia, northern China, Japan, North America, and Greenland.

Anagallidium dichotomum (L.) Griseb. *Gentian.* (1839) p. 312; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 592; Ledeb. Fl. Ross. III, p. 72; Turczan. Fl. Baical.-Dahur. (1849) p. 336, no. 798; Herder, Pl. Radd. (1872) p. 466; no. 136; Крыл. Фл. Алт. III (1904) p. 858. *Swertia dichotoma* L. Amoen. Acad. II, p. 317; Ledeb. Fl. Alt. I, p. 291; Turczan. Cat. Baical. no. 787.

The material collected is rather varying, but seemed to be separable into 2 forms, of which one is distinguished by a vigorous, compact growth, much branched from the base, and with short internodes. The rather large leaves are 3- to 5-nerved, and the upper pedicels generally so short that the flowers do not reach above the upper pair of leaves. The leaves are, like the branches, rather stiff and appressed-ascending. The petals are of a light, nearly white colour, with distinctly yellow, strongly marked veins. This form much recalls PALLAS's figure in Fl. Ross. t. II, fig. A.

The other form is distinguished by a more slender and delicate growth, with longer internodes, smaller and narrower, 1- to 3-nerved leaves. The fine pedicels are long and drooping. The petals are of a greenish colour, with distinct nerves of a rather deep green. These specimens are suggestive of PALLAS's illustration l. c. fig. C. For the rest, as regards the colour of the flowers in this species, PALLAS remarks: „Flores multo minores quam praecedentis viridiores, interdum subrubentes. . ." As my material is rather scarce, I dare not express any opinion on the systematic value of these characters.

The species is scattered in grass-grown places about the rivers Yenisei and Abakan, and on the islets, partly associated with *Moehringia lateriflora*, where collected by me in full flower in the middle and at the end of June.

Distribution: Dzungaria, southern Siberia, in the Yenisei valley northwards to 58° north lat., and eastwards to Trans Baikal, northern Mongolia.

Halenia sibirica Borkhausen, in Roemer, Archiv. I (1796) p. 25; Turczan. Cat. Baical. no. 788; Ledeb. Fl. Ross. III, p. 74; Turczan. Fl. Baical.-Dahur. (1849) p. 341, no. 801;

Herder, Pl. Radd. (1872) p. 468. no. 139; Крыл. Фл. Алт. III (1904) p. 859. *Swertia corniculata* L. Amoen. Acad. II, p. 317; Ledeb. Fl. Alt. I. p. 292.

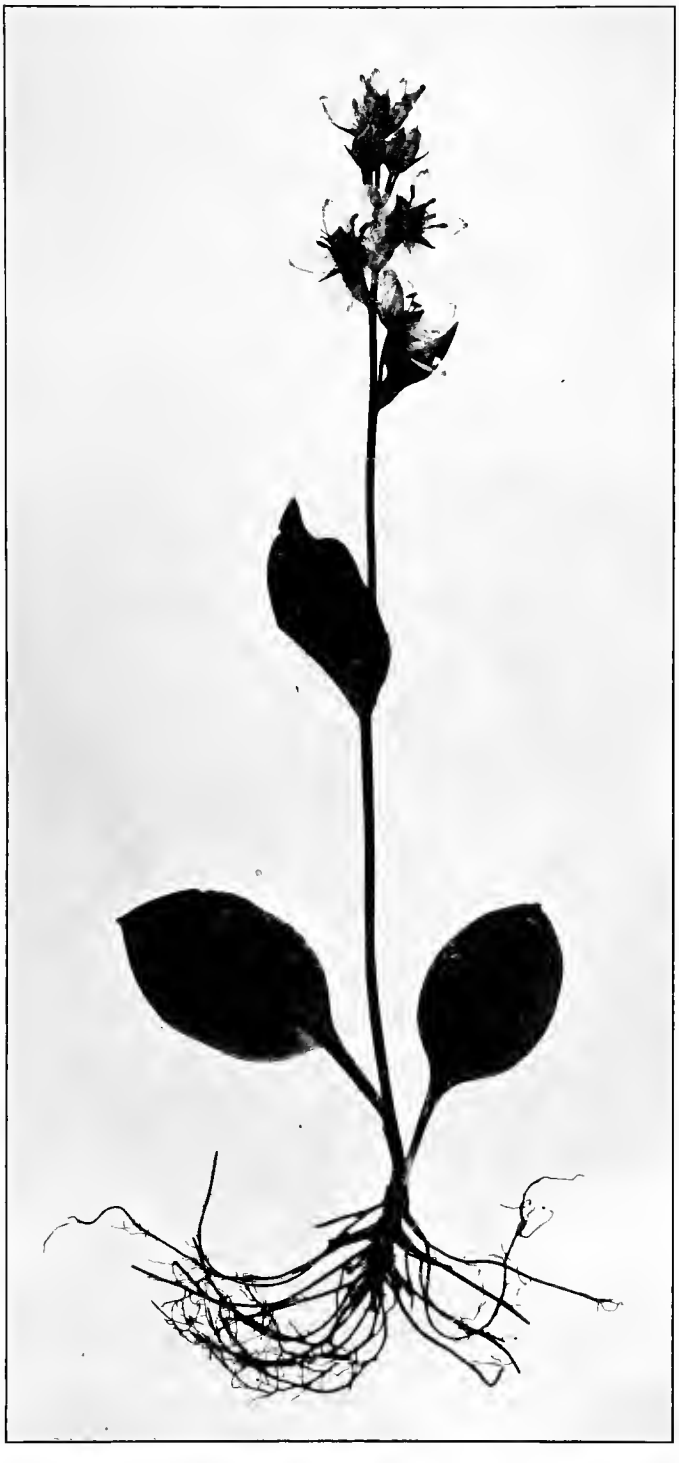

Fig. 102. *Swertia obtusa* Ledeb. from the Sayansk mountains (2/3).

Pretty common in moist meadows and in open brush-wood on islets in the river Abakan, near Askys, and at Ust Kamuishto. On the islets in the river Abakan, near Askys, I have collected a small-leaved form, in which the leaves are only 4—6 mm. broad, and 5—6 times as long, always 1-nerved only. Flowering in the middle of June. Near Ust Kamuishto I have collected some specimens of a more broad-leaved form, the leaves of which are 12—15 mm. broad, and about 3 times as long, always furnished with 3 distinct nerves. Of this one I have found young, not yet flowering specimens at the end of June. The species also occurs in the Urjankai country, where collected by me on flood-plains at Ust Tara-kem.

Distribution: From the Ural eastwards through Siberia to Kamtchatka and the Amoor Province, northern Mongolia, Manchooria, northern China, Sakhalin, Japan.

Swertia obtusa Ledeb. in Mem. Acad. St. Petersb. V, p. 526; Ledeb. Fl. Alt. I, p. 290; Turczan. Cat. Baical. no. 786; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 591; Ledeb. Fl. Ross. III, p. 75; Крыл. Фл. Алт. III (1904) p. 861. *S. perennis* Pallas, Fl. Ross. II, p. 98. *S. perennis β obtusa* Griseb. in DC. Prodrom. IX, p. 132; Turczan. Fl. Baical.-Dahur. (1849) p. 340, no. 800; Herder, Pl. Radd. (1872) p. 470, no. 141.

Pretty common in the Altaian, in somewhat moist, alpine grass-fields. In full flower at the end of July.

Distribution: Caucasia, the Ural, Siberia, northwards in the Yenisei valley to about 71° north lat., Kamtchatka, northern Mongolia.

Limnanthemum nymphoides (L.) Hoffm. et Link, Fl. Portug. I (1809) p. 344; Ledeb. Fl. Ross. III, p. 77; Turczan. Fl. Baical.-Dahur. (1849) p. 344, no. 803; Крыл. Фл. Алт. III (1904) p. 864. *Villarsia nymphoides* Vent, Ledeb. Fl. Alt. I, p. 221; Turczan. Cat. Baical. no. 790; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 591. *L. peltatum* Gmel., Herder, Pl. Radd. (1872) p. 473, no. 142.

In swamps at Ust Tara-kem, and on the Bei-kem, in ponds near the Dora Steppe. In flower at the end of August.

Distribution: Middle and southern Europe, south-western Asia to Cashmere and the Himalayas, northern India, southern Siberia to the Amoor Province, Manchooria and China, northern Mongolia, Japan, North America.

Menyanthes trifoliata L. Spec. Pl. ed. II (1762) p. 208; Ledeb. Fl. Alt. I, p. 221; Turczan. Cat. Baical. no. 789; Ledeb. Fl. Ross. III, p. 76; Turczan. Fl. Baical.-Dahur. (1849) p. 342, no. 802; Herder, Pl. Radd. (1872) p. 475, no. 144; Крыл. Фл. Алт. III (1904) p. 862.

In wet bogs and shallow ponds on the rivers Yenisei and Abakan, about Karatus and Kushabar, and in the Amyl taiga; pretty common in the Urjankai country, where I have collected it in turfy swamps at Ust Algiac, on the Upper Bei-kem, near Ust Kamsara, at Ust Tara-kem, and in the swamps by the dwellings of Petrow and Mosgalewski. In full flower in July and August.

Distribution: Europe, except the most south-western parts, south-western and northern Asia, in the Yenisei valley northwards to 69° north lat., and eastwards to Kamtchatka, the Amoor Province and Manchooria, southwards to the Himalayas, Cashmere, Mongolia, North America, Greenland.

Asclepiadaceae Lindl.

Vincetoxicum sibiricum (L.) Decaisne in DC. Prodrom. VIII, p. 525; Ledeb. Fl. Ross. III, p. 46; Turczan. Fl. Baical.-Dahur. (1849) p. 310, no. 776; Herder, Pl. Radd. (1872) p. 424, no. 104; Крыл. Фл. Алт. III (1904) p. 828. *Cynanchum sibiricum* (L.) R. Br. in Mem. Wern. Soc. I, p. 48; Ledeb. Fl. Alt. I, p. 279; Turczan. Cat. Baical. no. 765; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 575.

Pretty common in dry steppe meadows, on stony declivities, among gravel, etc., in the tracts about the river Abakan, and in the neighbourhood of Minusinsk. In full flower in the second half of June.

Distribution: Southern Siberia, middle Mongolia, Manchooria, Corea, northern China.

Convolvulaceae VENT.

Convolvulus arvensis L. Spec. Pl. ed. II (1762) p. 218; Ledeb. Fl. Alt. I, p. 224; Ledeb. Fl. Ross. III, p. 91; Turczan. Fl. Baical.-Dahur. (1849) p. 353, no. 809; Herder, Pl. Radd. (1872) p. 490, no. 150; Крыл. Фл. Алт. IV (1907) p. 868.

Near the village of Askys, on the Abakan Steppe, where scattered along borders of fields, etc. With flowers and flower-buds in the middle of June. The specimens collected belong to the forms *vulgaris* LEDEB. l. c., and *angustatus* LEDEB. l. c. Withered remains of this species I have also observed on the steppes along the Ulu-kem, at the end of August.

Distribution: Europe, except the most northern regions, south-western Asia, Siberia, in the Yenisei valley northwards to about 57° north lat., North Africa. In the East this species is replaced by the very nearly allied *Convolvulus sagittifolius* FISCHER.

Convolvulus Ammannii Desr. in Lamarck, Encycl. Method. III, p. 549; Ledeb. Fl. Alt. I, p. 226; Turczan. Cat. Baical. no. 798; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 600; Ledeb. Fl. Ross. III, p. 90; Turczan. Fl. Baical.-Dahur. (1849) p. 352, no. 808; Herder, Pl. Radd. (1872) p. 489, no. 149; Крыл. Фл. Алт. IV (1907) p. 869.

Rather common on the Abakan Steppe, especially in dry, sandy or stony places; with flowers in June. It also occurs in the Urjankai country, where I have observed it in several places on the steppes between Tapsa and Cha-kul, where past flowering at the end of August.

Distribution: Southern Siberia, northern Mongolia, Manchooria, China.

Cuscutaceae DUMORT.

Cuscuta europaea L. Spec. Pl. ed. II (1762) p. 180; Ledeb. Fl. Alt. I, p. 294; Turczan. Fl. Baical.-Dahur. (1849) p. 357, no. 811; Herder, Pl. Radd. (1872) p. 499, no. 154; Крыл. Фл. Алт. IV (1907) p. 874.

Here and there on islets in the rivers Yenisei and Abakan, where I have observed it on plants as *Campanula, Urtica, Cacalia hastata, Artemisia vulgaris*, and others. With young flower-buds in June.

Distribution: Nearly all over Europe, except the most northern parts, Siberia, northwards to about 61° north lat., Manchooria, south-western Asia, roughly to the north of India, North Africa.

Cuscuta lupuliformis Krocker, Fl. Siles. I (1787) p. 261; Herder, Pl. Radd. (1872) p. 501, no. 156; Крыл. Фл. Алт. IV (1907) p. 875. *C. monogyna* Ledeb. Fl. Alt. I, p. 294; Turczan. Fl. Baical.-Dahur. (1849) p. 358, no. 812; Herder, l. c. (1872) p. 500, no. 155.

var. **asiatica** Engelm., Крыл. l. c. (1907) p. 875.

The Asiatic specimens differ from the European ones in having the corolla-scales entire, ovate or broadly ovate, not 2-cleft. Of very common occurrence on low, sandy islets in the Bei-kem, near the mouth of the Tapsa, where it is parasitic on *Salix viminalis*. I have collected it in the last days of August with fruits of the size of a pea.

Distribution: The species occurs in middle and south-eastern Europe and adjacent parts of Asia, Siberia, eastwards to Trans Baikal, northern Mongolia.

Polemoniaceae DC.

Polemonium coeruleum L. Spec. Pl. ed. II (1762) p. 230; Ledeb. Fl. Alt. I, p. 232; Turczan. Cat. Baical. no. 791; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 595; Ledeb. Fl. Ross. III, p. 83; Turczan. Fl. Baical.-Dahur. (1849) p. 348, no. 805; Herder, Pl. Radd. (1872) p. 479, no. 146; Brand, *Polemoniaceae* in Engl. Pflanzenr. H. 27 (IV, 250, 1907) p. 37; Крыл. Фл. Алт. IV (1907) p. 866.

The specimens collected of this rather varying species, are characterized by having the upper parts of the stem, the pedicels, and the calyces woolly, and rather densely beset with long-stalked glandular hairs, by which character these specimens much recall *var. campanulatum* Th. Fr. The specimens, however, are always very flowery, with a much branched flower-cluster; the lobes of the corolla are subotuse at the top, not distinctly acutish, with glabrate margins. This margin of the petals is entire, or only very slightly and irregularly serrate, only here and there furnished with a single or some few scattered hairs. The flowers are comparatively small, the corolla 12—15 mm. long.

Scattered in thickets in the subalpine wooded tracts about the Upper Amyl, on the Sisti-kem, and at Ust Kamsara. In the Altaian I have found it up to the tree limit. In full flower in July.

Distribution: Europe, except the most southern portions, northern and temperate parts of Asia, southwards to the Himalayas and northern China, Sakhalin, Japan, North America (Alaska).

Borraginaceae Lindl.

Anchusa myosotidiflora Lehm. *Asperifol.* (1818) p. 234.

var. **grandiflora** DC. Prodrom. X, p. 50; Ledeb. Fl. Ross. III, p. 121; Крыл. Фл. Алт. IV (1907) p. 880.

Scattered in humid, grass-grown places in the Amyl taiga; nearly past flowering about the middle of July.

Distribution: Caucasia, western Siberia, eastwards to the government of Yeniseisk.

Onosma echioides L. Spec. Pl. ed. II (1762) p. 196.

var. **Gmelini** (Ledeb.) Krylow, Фл. Алт. IV (1907) p. 881. *O. Gmelini* Ledeb. Fl. Alt. I, p. 184; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 612; Ledeb. Fl. Ross. III, p. 126; Herder, Pl. Radd. (1872) p. 504, no. 159.

Pretty common in the Minusinsk district and in the tracts along the rivers Yenisei and Abakan, where occurring on dry, stony steppes. Not observed anywhere in abundance by me. Generally occurring singly, scattered on the steppes, where reaching considerably higher than the surrounding low steppe vegetation, and — being, besides, of a

characteristic yellowish green colour, partly due to the dense and stiff hairs, partly to the great number of large, yellow flowers — it is a very characteristic and easily recognizable plant on these steppes, where it strikes the eye at a great distance. The root contains a blood-red pigment. In full flower in June.

Distribution: The species occurs in southern Europe, from Spain and the south of France, eastwards through Switzerland, Austro-Hungary, the Mediterranean countries, the Balkan Peninsula, southern Russia, south-western Asia, southern Siberia, eastwards roughly to the Yenisei. The above variety is restricted to its eastern range, from about the Thian-Shan and Alatau to the west.

Onosma simplicissimum L. Spec. Pl. ed. II (1762) p. 196; Ledeb. Fl. Alt. I, p. 183; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 611; Ledeb. Fl. Ross. III, p. 127; Крыл. Фл. Алт. IV (1907) p. 882.

This plant has been found by me on stony declivities on the steppes at Minusinsk, near Tagarski osero. In flower at the beginning of July.

Distribution: South-eastern Europe, Russian Turkestan, southern Siberia, eastwards roughly to the Yenisei.

Lithospermum officinale L. Spec. Pl. ed. II (1762) p. 189; Ledeb. Fl. Alt. I, p. 174; Turczan. Cat. Baical. no. 802; Ledeb. Fl. Ross. III, p. 130; Turczan. Fl. Baical.-Dahur. (1850) p. 500, no. 814; Herder, Pl. Radd. (1872) p. 504, no. 160; Крыл. Фл. Алт. IV (1907) p. 884.

On the Abakan Steppe, near Askys, with young flower-buds in the middle of June; scattered about Karatus and Kushabar.

Distribution: Europe, except the most northern and south-western parts, Caucasia and south-western Asia, Siberia, eastwards to about Lake Baikal.

Pulmonaria mollissima Kerner, Monogr. *Pulmon.* (1878) p. 47; Крыл. Фл. Алт. IV (1907) p. 886. *P. mollis* Ledeb. Fl. Alt. I, p. 179; Turczan. Cat. Baical. no. 807; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 610; Ledeb. Fl. Ross. III, p. 137; Turczan. Fl. Baical.-Dahur. (1850) p. 506, no. 819. *P. angustifolia* Herder, Pl. Radd. (1872) p. 515, no. 169.

In moist and shady, grass-grown places in the Amyl taiga and in similar habitats, near Ust Sisti-kem. Past flowering in July.

Distribution: Middle Europe, Caucasia, Siberia, in the Yenisei valley northwards to 61½° north lat., and eastwards to about the government of Yakutsk, northern Mongolia.

Mysotis palustris (L.) Lamarck, Fl. Franc. II (1778) p. 283; Turczan. Fl. Baical.-Dahur. (1850) p. 509, no. 821; Herder, Pl. Radd. (1872) p. 519, no. 172.

var. **nemorosa** (Besser) Schmalh. Фл. Средн. и Южн. Россіи II, p. 234; Крыл. Фл. Алт. IV (1907) p. 889. *M. nemorosa* Besser, Enum. Pl. Volhyn. (1822) p. 52, no. 1464; Ledeb. Fl. Alt. I, p. 188; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 616; Ledeb. Fl. Ross. III, p. 143.

This variety, the most frequent one in Siberia, is very characteristic in having the

upper parts of the stem strigose, while the lower parts of the stem are glabrous and shining, and often finely striate. The leaves are, on the upper as well as on the under sides, rather densely covered with thick, appressed hairs, showing the peculiarity of being turned downwards on the under sides of the lower leaves, while, on the upper sides of the same leaves as well as on both sides of all the leaves higher up, they are turned upwards. The style is about ⅓ shorter than the calyx. Specimens from the different localities show, for the rest, that the species varies rather much in the size and number of the flowers, in the shape and size of the leaves, etc. The lobes of the corolla may be entire and rounded at the top, or more or less indented. On the Lower Abakan I have found a form with large, white petals, *f. lactiflora*. It occurs here together with specimens of the typical colour. A form with very small flowers, only about 4 mm. broad, has been collected by me at Askys, and a similar small-flowered form, with a more concave limb, occurs on the islets in the Yenisei, near Ust Abakansk. In some specimens the lower parts of the stem are sparingly pubescent, as it also appears from some specimens that the stem may be slightly winged.

The species is of very common occurrence in the territory explored, where growing in marshy places, such as moist meadows and thickets, on river-banks, and the like. On the islets in the rivers Yenisei and Abakan, near Karatus, at Kushabar, in the Amyl valley, Ust Algiac, Ust Sisti-kem, on the Kamsara, and near the Tara-kem. In full flower in June and July.

Distribution: All over Europe, except the southern parts, south-western Asia, Siberia, in the Yenisei valley northwards to 71° north lat., and eastwards to about the Lena, northern Mongolia, Madeira, North America.

Myosotis caespitosa Schultz, Fl. Stargard. II, p. 11; Ledeb. Fl. Alt. I, p. 188; Turczan. Cat. Baical. no. 812; Ledeb. Fl. Ross. III, p. 144; Turczan. Fl. Baical.-Dahur. (1850) p. 510, no. 822; Herder, Pl. Radd. (1872) p. 522, no. 173; Крыл. Фл. Алт. IV (1907) p. 890.

In moist, partly inundated, shady places on the banks of islets in the Yenisei, near Ust Abakansk. Young flowers at the end of June.

Distribution: Nearly all over Europe, except the southern parts, Caucasia and south-western Asia to the Himalayas, Siberia, to southern Kamtchatka, the Amoor Province, Manchooria, North Africa.

Myosotis silvatica Hoffm. Deutschl. Fl. I, p. 65; Turczan. Fl. Baical.-Dahur. (1850) p. 510, no. 823; Ledeb. Fl. Ross. III, p. 145; Herder, Pl. Radd. (1872) p. 529, no. 174; Крыл. Фл. Алт. IV (1907) p. 891. *M. intermedia α grandiflora* Ledeb. Fl. Alt. I, p. 187.

Rather common in meadows on the islets in the Abakan, and in moist, grass-grown places on the steppe, near Ust Abakansk, in thickets of *Caragana arborescens*, together with *Aster alpinus, Stellaria graminea, Solidago Virgaurea, Fragaria viridis, Iris ruthenica*, and others. In full flower at the beginning of June.

var. **alpestris** (Schmidt) Koch, Synops. p. 505; Ledeb. Fl. Ross. III, p. 145; Herder,

Pl. Radd. (1872) p. 529, no. 175; Крыл. l. c. (1907) p. 891. *M. alpestris* Schmidt, Fl. Bohem. III (1794) p. 26; Ledeb. Fl. Alt. I, p. 189; Turczan. Cat. Baical. no. 810; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 615.

This variety differs from the preceding one in being of a lower and more caespitose growth, and with a more congested, shorter and thicker raceme. The flowers are mostly larger, and the pedicels rather short, not longer than the calyx. The flowers are of a dark blue, slightly fragrant. Collected in the Amyl taiga and in the Altaian, in alpine and subalpine meadows, frequently in somewhat moist places, where I have collected it in full flower at the end of July.

Distribution: Nearly all over Europe, Caucasia, south-western and northern Asia, southwards to Persia, Pamir and the Himalayas, eastern Asia, Sakhalin.

Myosotis intermedia Link, Enum. Hort. Berol. I (1819) p. 164; Ledeb. Fl. Alt. I, p. 187 (excl. var. *α*); Ledeb. Fl. Ross. III, p. 146; Крыл. Фл. Алт. IV (1907) p. 892. *M. arvensis* Ledeb. Fl. Alt. I, p. 187.

In rather dry, sandy places on the islets in the Yenisei, on dry steppe meadows and hills on the Abakan Steppe, and at Kushabar. Flowering in June and July.

Distribution: Europe, Caucasia, south-western Asia, Siberia, eastwards to the Amoor Province, Corea, Japan, Africa, North America.

Eritrichium pectinatum (Pall.) DC. Prodrom. X, p. 127; Ledeb. Fl. Ross. III, p. 152; Herder, Pl. Radd. (1872) p. 538, no. 179; Крыл. Фл. Алт. IV (1907) p. 896. *E. incanum* DC. l. c., Turczan. Fl. Baical.-Dahur. (1850) p. 514, no. 827. *Myosotis incana* Turczan. Cat. Baical. no. 816. *M. ciliata* Ledeb. Fl. Alt. I, p. 191. (Incl. *E rupestre* Bunge).

Rather frequent on the Abakan Steppe, especially on stony declivities and sandy, hot steppe meadows. Collected in full flower in June. I cannot find that *E. rupestre* Bunge, of which I have examined a rich material in Petrograd, differs from the present species by characters of real, systematic value, and therefore I refer it as a synonym under *E. pectinatum* (Pall.) DC.

Distribution: Siberia and northern Mongolia, Manchooria, Corea, China, Tibet.

Echinospermum Lappula (L.) Lehm. *Asperifol.* (1818) p. 121; Ledeb. Fl. Alt. I, p. 198; Ledeb. Fl. Ross. III, p. 155; Крыл. Фл. Алт. IV (1907) p. 900.

var. **anisacanthum** (Turczan.) Trautv., Крыл. l. c. (1907). *E. anisacanthum* Turczan. Cat. Baical. no. 824; Ledeb. Fl. Ross. III, p. 156; Turczan. Fl. Baical.-Dahur. (1850) p. 520, no. 833; Herder, Pl. Radd. (1872) p. 551, no. 189.

Along borders of fields, on slopes, and near habitations, on the Abakan Steppe, where rather frequent, and scattered in the cultivated tracts between Minusinsk and Kushabar. In full flower in June. Withering remains of this species I have, besides, found on the steppes about the Ulu-kem, at the end of August.

Distribution: The species is distributed over the greater part of Europe, except the most northern and southern parts, south-western Asia, Siberia, in the Yenisei valley northwards to about 62° north lat., and eastwards to the Sea of Okhotsk, northern Mongolia, Manchooria, Corea, northern China, North Africa. The variety *anisacanthum* occurs in the eastern part of the area, viz. from about the Yenisei through Trans Baikal and Dahuria to Manchooria, China and Corea.

Cynoglossum officinale L. Spec. Pl. ed. II (1762) p. 192; Ledeb. Fl. Alt. I, p. 195; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 622; Ledeb. Fl. Ross. III, p. 165; Herder, Pl. Radd. (1872) p. 553, no. 191; Крыл. Фл. Алт. IV (1907) p. 909.

Scattered in dry, sandy places on the islets in the river Abakan, at Askys, and near habitations on the steppe, at Ust Kamuishto. In flower and in part done flowering in the second half of June.

Distribution: Europe, except the most northern and southern parts, south-western Asia, Siberia, northwards to 68½° north lat. in the Yenisei valley, and eastwards to Trans Baikal, North America (adventive from Europe).

Labiatae JUSS.

Mentha arvensis L. Spec. Pl. ed. II (1763) p. 806; Ledeb. Fl. Alt. II, p. 400; Turczan. Cat. Baical. no. 897; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 689; Ledeb. Fl. Ross. III, p. 338; Turczan. Fl. Baical.-Dahur. (1851) p. 365, no. 893; Herder, Pl. Radd. (1885) p. 119, no. 521; Крыл. Фл. Алт. IV (1907) p. 1006. *M. canadensis* Turczan. Fl. Baical.-Dahur. (1851) p. 365, no. 894. *M. austriaca* Turczan. Cat. Baical. no. 898.

Pretty common on islets in the river Abakan, and in moist places on the Amyl, near Kushabar. In the month of June, I have only collected young, flowerless plants. In the Urjankai country I have collected the species at Ust Sisti-kem and at Ust Tara-kem, near the river.

Specimens from the different localities vary rather much in stature, in hairiness, ramification, shape of the leaves, length of the petioles, etc.

Distribution: Nearly all over Europe, except the most southern and northern parts, Siberia, in the Yenisei valley northwards to 67½° north lat., and eastwards to Kamtchatka, the Amoor Province and Manchooria, south-western Asia to the Himalayas, northern China, Sakhalin, Japan, North Africa, and North America (adventive from Europe).

Mentha aquatica L. Spec. Pl. ed. II (1763) p. 805; Ledeb. Fl. Alt. II, p. 399; Ledeb. Fl. Ross. III, p. 337; Крыл. Фл. Алт. IV (1907) p. 1007.

In thickets on the banks of the river Abakan, near Askys, in humid, partly inundated places. Young, flowerless specimens collected in June.

Distribution: Europe, except the extreme north, Caucasia and south-western Asia,

Siberia, except the extreme east, North and South Africa, America (naturalized from Europe).

Lycopus europaeus L. Spec. Pl. ed. II (1762) p. 30; Ledeb. Fl. Alt. I, p. 18; Turczan. Cat. Baical. no. 911; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 704; Ledeb. Fl. Ross. III, p. 341; Turczan. Fl. Baical.-Dahur. (1851) p. 267, no. 895; Herder, Pl. Radd. (1885) p. 127, no. 554; Крыл. Фл. Алт. IV (1907) p. 1008.

On the banks of the river Abakan, near Ust Abakansk, in humid, grass-grown places. Only leaves in the last days of June.

Distribution: Europe, except the northern parts, Caucasia and south-western Asia, roughly to the Himalayas, Siberia, eastwards to about Lake Baikal, northern China, North Africa, North America (introduced).

Origanum vulgare L. Spec. Pl. ed. II (1763) p. 824; Ledeb. Fl. Alt. II, p. 396; Turczan. Cat. Baical. no. 893; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 687; Ledeb. Fl. Ross. III, p. 343; Turczan. Fl. Baical.-Dahur. (1851) p. 369, no. 897; Herder, Pl. Radd. (1885) p. 134, no. 557; Крыл. Фл. Алт. IV (1907) p. 1010.

In thickets, on dry hills, etc., near Kushabar, and on dry, open declivities in the Amyl taiga. Collected with young flower-buds in the middle of July. In the Urjankai country at Ust Kamsara, on dry, open declivities, with ripe nutlets about the middle of August.

Distribution: Europe, except the most northern parts, Caucasia and south-western Asia to the Himalayas, Siberia, in the Yenisei valley northwards to about 61° north lat., and eastwards to Trans Baikal, North America (introduced).

Thymus Serpyllum L. Spec. Pl. ed. II (1763) p. 815; Ledeb. Fl. Alt. II, p. 390; Turczan. Cat. Baical. no. 887; Ledeb. Fl. Ross. III, p. 345; Turczan. Fl. Baical.-Dahur. (1851) p. 371, no. 898; Herder Pl. Radd. (1885) p. 141, no. 558; Крыл. Фл. Алт. IV (1907) p. 1011.

Common on the Abakan Steppe, especially on dry, sunny rocks, in gravel and sand, together with plants as *Patrinia sibirica, Phelipaea lanuginosa, Campanula sibirica,* etc. Collected in full flower in the month of June. This plant is used by the natives, the Mongolian Abakan Tatars, as incense, during their shaman feasts. The species is also rather frequent in the Urjankai country, especially in the wooded steppe region, where I have met with it at Ust Sisti-kem, Ust Kamsara, and at Ust Tara-kem, on open declivities, in dry, sandy larch forest, and the like. The specimens collected seem, at any rate partly, to belong to var. *angustifolius* Ledeb.

Distribution: Europe, south-western and northern parts of Asia, northwards in the Yenisei valley to about 72° north lat., and eastwards to Kamtchatka, the Amoor Province, Manchooria, Corea and northern China, southwards to Tibet, the Himalayas and the East Indies, Sakhalin, Japan, North Africa, Greenland, North America (introduced).

Calamintha Acinos (L.) Clairville in Gaud. Fl. Helv. IV (1829) p. 84; Ledeb. Fl. Ross. III, p. 353.

In my collections I have only a single specimen of this one, taken near Kushabar, on dry hills. In full flower in the middle of July. This plant does not seem to have been observed heretofore in Siberia, and has not been entered in the common enumerations of plants from there, its distribution being previously regarded as limited eastwards to about the Ural. The specimen collected fully agrees with the typical *C. Acinos.*

Distribution: Europe, except the most northern and southern parts, Caucasia, Siberia, hitherto observed only about Kushabar, North America (introduced).

Nepeta lavandulacea L. fil. Supplem. p. 272; Ledeb. Fl. Alt. II, p. 404; Ledeb. Fl. Ross. III, p. 372; Turczan. Fl. Baical.-Dahur. (1851) p. 374, no. 901; Herder, Pl. Radd. (1887) p. 4, no. 567; Крыл. Фл. Алт. IV (1907) p. 1024. *N. multifida* Turczan. Cat. Baical. no. 895.

Pretty common on the Abakan Steppe and on the steppes about Minusinsk, where occurring on dry rocks, along dried up brooks' courses, among stones and gravel. Collected in full flower in June.

Distribution: Southern Siberia, in the Yenisei valley northwards to 57° north lat., and eastwards to the Amoor Province and Manchooria, northern Mongolia.

Nepeta nuda L. Spec. Pl. ed. II (1763) p. 797; Ledeb. Fl. Ross. III. p. 377; Крыл. Фл. Алт. IV (1907) p. 1026. *N. pannonica, N. violaea* et *N. ucrainica* in Ledeb. Fl. Alt. II, p. 403.

On dry, grass-grown declivities on the steppe, near Karatus, where I have collected it in full flower in the middle of July. The petals in the specimens collected are nearly completely white.

Distribution: Middle and southern Europe, Caucasia and south-western Asia, southern Siberia, eastwards roughly to the Yenisei.

Glecoma hederacea L. Spec. Pl. ed. II (1763) p. 807 (*Glechoma* auct.); Ledeb. Fl. Alt. II, p. 400; Turczan. Cat. Baical. no. 902. *N. Glechoma* (L.) Benth. *Labiat.* Gen. et Sp. (1834) p. 485; Ledeb. Fl. Ross. III, p. 379; Turczan. Fl. Baical.-Dahur. (1851) p. 375, no. 902; Herder, Pl. Radd. (1887) p. 4, no. 568; Крыл. Фл. Алт. IV (1907) p. 1030.

Common on islets in the rivers Yenisei and Abakan, in thickets and in grass-grown places. The species begins flowering at the beginning of June. At Kushabar I have met with this species on dry mountain-sides, near the village.

Distribution: Europe, except the most northern and southern parts, Caucasia, the north of Asia Minor, Trans Caspia, Siberia, in the Yenisei valley northwards to about 60° north lat., eastwards to Kamtchatka, the Amoor Province and Manchooria, northern China, Japan, North America.

Dracocephalum discolor Bunge, Enum. Alt. p. 38; Ledeb. Fl. Ross. III, p. 383; Крыл. Фл. Алт. IV (1907) p. 1033. *D. origanoides* Ledeb. Fl. Alt. II, p. 383 (excl. syn.).

On dry, sunny rocks on the Abakan Steppe, near Ust Kamuishto, and near Askys. In flower and partly done flowering about the middle of June.

Distribution: The species is rather rare, and is only to be found in Turkestan, Pamir, and southern Siberia (where known from the river Tsharysh, and from the neighbourhood of Minusinsk).

Dracocephalum altaiense Laxmann in Nov. Comment. Acad. Petropol. XV, p. 556; Ledeb. Fl. Alt. II, p. 384; Bunge, Enum. Alt. p. 36; Turczan. Cat. Baical. no. 883; Karel. et Kiril. Enum. Pl. Alt. no. 677; Ledeb. Fl. Ross. III, p. 385; Turczan. Fl. Baical.-Dahur. (1851) p. 378, no. 904; Herder, Pl. Radd. (1887) p. 9, no. 573; Крыл. Фл. Алт. IV (1907) p. 1037.

This characteristic species is pretty common in the Altaian, on mountain-sides, at an altitude of about 1900—2000 m. above sea-level, in places covered with stony débris, among shrubs, etc. It seemed to prefer here the south sides of the mountains, and is one of the prettiest and most conspicuous alpine plants in these regions. Collected in full flower at the end of July.

Distribution: Turkestan, the Thian-Shan, southern Siberia, eastwards roughly to Trans Baikal, northern Mongolia, northern China.

Dracocephalum nutans L. Spec. Pl. ed. II (1763) p. 831; Ledeb. Fl. Alt. II, p. 386; Turczan. Cat. Baical. no. 886; Ledeb. Fl. Ross. III, p. 387; Turczan. Fl. Baical.-Dahur. (1851) p. 381, no. 907; Herder, Pl. Radd. (1887) p. 11, no. 576; Крыл. Фл. Алт. IV (1907) p. 1039.

Scattered on the steppes about the river Abakan, especially on rocks, among stones and gravel along dried up brooks' courses, etc. In full flower in the middle of June. In the Urjankai country the species is characteristic of dry, open declivities and rocky slopes in the genuine wooded steppe region, where I have met with it at Ust Kamsara and at Üst Tara-kem.

Distribution: Russian Turkestan, Cashmere, southern Siberia, in the Yenisei valley northwards to about 66° north lat., and eastwards roughly to the Lena, northern Mongolia.

Dracocephalum peregrinum L. Spec. Pl. ed. II (1763) p. 829; Ledeb. Fl. Alt. II, p. 388; Bunge, Enum. Alt. p. 42; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 681; Ledeb. Fl. Ross. III, p. 389; Herder, Pl. Radd. (1887) p. 13, no. 578; Крыл. Фл. Алт. IV (1907) p. 1042.

On rocky slopes on the mountain Uzuik, above Ust Abakansk. With flowers at the end of June.

Distribution: Southern Siberia, eastwards to about Lake Baikal, Russian Turkestan, northern Mongolia.

Dracocephalum Ruyschiana L. Spec. Pl. ed. II (1763) p. 830; Ledeb. Fl. Alt. II, p. 388; Turczan. Cat. Baical. no. 881; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 680; Ledeb. Fl. Ross. III, p. 389; Turczan. Fl. Baical.-Dahur. (1851) p. 382, no. 909; Herder, Pl. Radd. (1887) p. 13, no. 579; Крыл. Фл. Алт. IV (1907) p. 1044.

Scattered in dry meadows on islets in the river Abakan, on dry hill-slopes on the Abakan Steppe, near Askys, and between Karatus and Kushabar. Nearly done flowering, and partly with ripe fruits in the middle of June. All of the specimens belong to *f. vulgare* Ledeb. Fl. Ross. III, p. 389. The species is, moreover, rather frequent in the Urjankai country, where I have collected specimens in dry, sandy woods of larch and pine at Ust Sisti-kem, on dry declivities at Ust Kamsara, and near Ust Tara-kem.

Distribution: Europe, except the most northern and southern regions, Caucasia, Russian Turkestan, the Thian-Shan, southern Siberia, northwards to about 58° north lat., and eastwards roughly to Trans Baikal, northern Mongolia. The typical species does not occur in eastern Asia and in Japan, but is replaced here by the easterly *var. speciosum* Ledeb. (Fl. Ross. III, p. 320. *D. arguense* Fischer in Link, Enum. Pl. Hort. Berol. II, p. 118), distributed in Trans Baikal, the Amoor Province, Manchooria, Corea, northern China, and Japan.

Brunella vulgaris L. Spec. Pl. ed. II (1763) p. 837 (auct. *Prunella*); Ledeb. Fl. Alt. II, p. 382; Turczan. Cat. Baical. no. 880; Ledeb. Fl. Ross. III, p. 392; Turczan. Fl. Baical.-Dahur. (1851) p. 386, no. 910; Herder, Pl. Radd. (1887) p. 15, no. 581; Крыл. Фл. Алт. IV (1907) p. 1045.

Pretty common in somewhat moist meadows, and in thickets on islets in the rivers Yenisei and Abakan, frequent between Karatus and Kushabar, in the Amyl taiga, about the Sisti-kem, and at Ust Algiac. The species begins flowering about the middle of June.

Distribution: Nearly throughout Europe and Asia, in the Yenisei valley northwards to about 65° north lat., and southwards to the north of India, North Africa, North America, Australia.

Scutellaria scordiifolia Fischer, Ind. Hort. Bot. Petropol. p. 62; Bunge, Enum. Alt. p. 42; Turczan. Cat. Baical. no. 890; Ledeb. Fl. Ross. III, p. 398; Turczan. Fl. Baical.-Dahur. (1851) p. 389, no. 912; Крыл. Фл. Алт. IV (1907) p. 1050. *S. Adamsii* Spreng., Ledeb. Fl. Alt. II, p. 393. *S. galericulata* L. *δ scordifolia* (Fischer) Herder, Pl. Radd. (1887) p. 28.

It appears from the material collected that this species varies considerably as to the shape of the leaves and the length of the petioles; the margin of the leaves is generally more or less distinctly and deeply serrate, with appressed teeth (*f. crenata* Freyn), more rarely completely entire. The base of the leaves either slightly cuneate, more or less square cut, or cordate, whereby the leaves may sometimes bear resemblance to the nearly allied *S. galericulata* L. They differ, however, from the latter by having always the under side of the leaves more or less distinctly glandular, and as for the flowers, they are generally considerably larger than in the said species. The stems and the leaves are completely glabrous or nearly so (*f. subglabra* Komar.), or, at times, densely hairy (*f. pubescens* Regel). The corolla is 1,8—2,3 cm. in length. The tube is in its lower part, right above the calyx, nearly rectangularly curved, whereby the flowers, during the flowering, take up a nearly vertical position.

Fig. 103. *Scutellaria scordiifolia* FISCHER (3/4).

The specimens collected by me, of which the opposite figure represents an illustration, differ rather much from KOMAROW's draughts of this species in Фл. Маньчжуріи III (1907) t. IV, f. II. Thus, the leaves in my specimens are always more or less distinctly petioled; the lower leaves are generally more long-petioled than the upper ones, and even if the petiole is short, it can be distinctly pointed out. The leaves are also comparatively narrower, on an average 0,5—0,8 cm. broad, and 3—4 cm. long, almost equally broad or gradually tapering upwards, rounded or subobtuse at the summit, while the leaves in the said drawing of KOMAROW's are of a quite different shape, viz. ovate — oblong, cuneately tapering towards the base, and acuminate at the apex. The upper sides of the

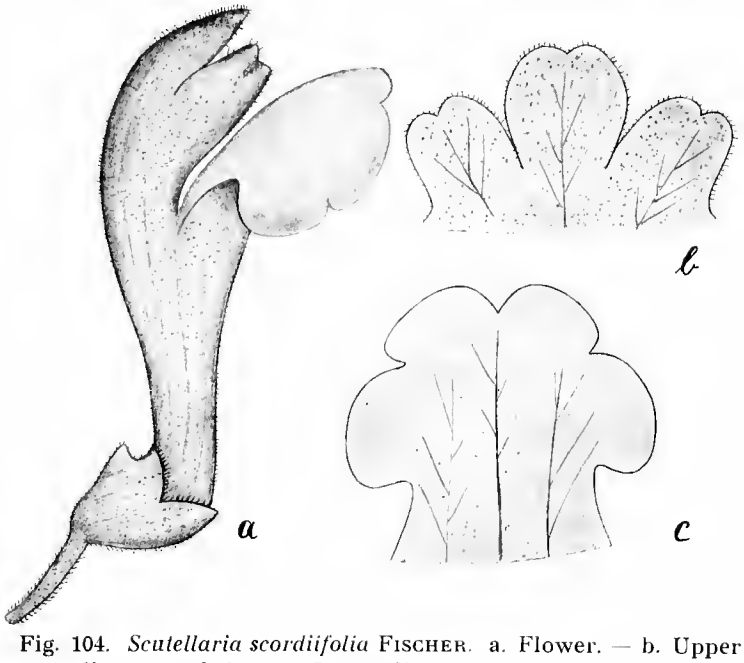

Fig. 104. *Scutellaria scordiifolia* FISCHER. a. Flower. — b. Upper lip, expanded. — c. Lower lip, expanded (ca. 3,5/1).

leaves are glabrous, the margins and the nerves of the under sides distinctly pubescent and glandular, glabrous for the rest. The flowers are short-pedicelled, the pedicels generally only a few mm. long, and the corolla-tube is in all the specimens collected distinctly rectangularly curved at the base, while KOMAROW's specimens — to judge from the drawing — have the corolla-tubes straight. The calyx, and especially the corolla-tube and the upper lip are puberulent and glandulous. The lower lip is glabrous, larger, and farther projecting than the upper ones, while the lower lip in the drawing quoted is small, undivided, and shorter. Thus, it will appear that my specimens differ rather considerably from those figured and described by KOMAROW from Manchooria, but they

agree prefectly with material which I have seen from the herbarium of the Riksmuseum at Stockholm.

Specimens agreeing with the above description I have found to be rather common in moist thickets on islets in the river Abakan, and in moist brush-wood on the banks of the river Amyl, near Kushabar; in the Urjankai country I have collected the species in thickets at Ust Sisti-kem. The species seemed to begin flowering about the middle of June.

Distribution: Southern and eastern Siberia to Kamtchatka, the Amoor Province and Manchooria, northern Mongolia, Corea, northern China, Sakhalin, Japan.

Stachys silvaticus L. Spec. Pl. ed. II (1763) p. 811; Ledeb. Fl. Alt. II, p. 407; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 695; Ledeb. Fl. Ross. III, p. 413; Крыл. Фл. Алт. IV (1907) p. 1054.

In dry thicket near Kushabar, and in the Amyl taiga, where collected in full flower in the middle of July. In comparison with Scandinavian material, the specimens collected here by me are characteristic in having mostly the calyx-teeth considerably broader and shorter, and more erect, not diverging. The bracts also mostly seemed to be more broadly ovate-lanceolate, tapering at the top, and acuminate, but never mucronate. The leaves, especially the lower ones, are distinctly crenate at the margin, and not serrate. My material, however, is so scarce that I dare not express any opinion on the systematic value of this character.

Distribution: Europe, except the extreme north and south, Caucasia, Russian Turkestan, the western Himalayas, southern Siberia, eastwards roughly to the Yenisei.

Stachys palustris L. Spec. Pl. ed. II (1763) p. 811; Ledeb. Fl. Alt. II, p. 408; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 696; Ledeb. Fl. Ross. III, p. 414: Turczan. Fl. Baical.-Dahur. (1851) p. 395, no. 917; Herder, Pl. Radd. (1887) p. 30, no. 589; Крыл. Фл. Алт. IV (1907) p. 1055.

In moist meadows near the river Amyl, south of Kushabar, and near Ust Algiac, where collected with young flowers in the middle of July; at Ust Sisti-kem, and on flood-plains at Ust Tara-kem, with fruits at the end of August. The specimens differ from the common Scandinavian ones I have had for comparison by having the bracts in the whole flower-cluster larger, more foliaceously developed, and even the upper ones projecting much further than the flowers, the lower ones 6—10 times as far as the flowers, being thus of about the same size as the ordinary leaves of the plant. The lower bracts are — like the leaves for the rest — serrate at the margin, the upper ones becoming gradually entire; they are also considerably broader than in the typical species, of a nearly ovate shape, with a rather far produced, acute apex, hairy on the upper as well as on the under side. This form is probably identical with *f. bractea* B. v. Mannagetta, Fl. Nied. Oesterr. Vol. II (1893) p. 1013.

Distribution: Nearly all over Europe, except the most northern and southern por-

tions, Caucasia and south-western Asia, roughly to Cashmere, Siberia, northwards to about 65° north lat., and eastwards to towards Lake Baikal, North America. In eastern Asia this form is replaced by the nearly allied *Stachys baicalensis* Fischer (ex Bentham, *Labiat.*p. 543) = *S. palustris* var. *hispida* Ledeb. (Fl. Ross. III, p. 414) = *S. palustris* var. *baicalensis* Turczan. (Enum. Pl. Chin. no. 160).

Galeopsis Tetrahit L. Spec. Pl. ed. II (1763) p. 810; Ledeb. Fl. Alt. II, p. 406; Turczan. Cat. Baical. no. 899; Ledeb. Fl. Ross. III, p. 420; Turczan. Fl. Baical.-Dahur. (1851) p. 397, no. 918; Herder, Pl. Radd. (1887) p. 33, no. 591; Крыл. Фл. Алт. IV (1907) p. 1058.

As a weed in fields on the Abakan Steppe, pretty common in waste places along the road between Minusinsk and Kushabar, near habitations in the Amyl taiga, about Ust Algiac, near Ust Sisti-kem, and on declivities at Ust Kamsara. The species begins flowering in July.

Distribution: Europe, except the southern parts, Siberia, in the Yenisei valley northwards to about 63° north lat., and eastwards to Kamtchatka, the Amoor Province and Manchooria, northern Mongolia, the Himalayas, Sakhalin, Japan, America (introduced).

Leonurus tataricus L. Spec. Pl. ed. II (1763) p. 818; Turczan. Cat. Baical. no. 905; Ledeb. Fl. Ross. III, p. 424; Turczan. Fl. Baical.-Dahur. (1851) p. 399, no. 919; Herder, Pl. Radd. (1887) p. 38, no. 594; Крыл. Фл. Алт. IV (1907) p. 1059. *L. altaicus* Spreng. Syst. Veget. II, p. 738; Ledeb. Fl. Alt. II, p. 410.

Scattered on dry, stony declivities, among stones and gravel along dried up brooks' courses on the Abakan Steppe, near Askys, and at Ust Kamuishto, and also scattered on the steppe, near the road between Karatus and Kushabar. Specimens collected on the Abakan Steppe in the middle of June, are in full flower. The specimens collected belong to *α typicus* Kryl. l. c. p. 1060. In the Urjankai country the species occurs in dry thickets and on hill-slopes at Ust Kamsara and Ust Tapsa.

Distribution: From south-eastern Russia through Siberia, roughly to Trans Baikal, northern Mongolia.

Panzeria lanata (L.) Pers. Synops. II (1807) p. 126; Ledeb. Fl. Alt. II, p. 410; Крыл. Фл. Алт. IV (1907) p. 1062. *L. lanatus* Ledeb. Fl. Ross. III, p. 425; Turczan. Fl. Baical.-Dahur. (1851) p. 401, no. 921; Herder, Pl. Radd. (1887) p. 40, no. 596.

Frequent in dry, stony and gravelly places on the Abakan Steppe, near the Tatarian burial ground at Ust Kamuishto, and on the steppes along the rivers Bei-kem and Ulu-kem, from Tapsa to Cha-kul, in places pretty common. Specimens collected on the Abakan Steppe in the second half of June, are in full flower.

Distribution: Southern Siberia from the Altai, eastwards to Trans Baikal, northern Mongolia.

Lamium album L. Spec. Pl. ed. II (1763) p. 809; Ledeb. Fl. Alt. II, p. 406; Turczan. Cat. Baical. no. 900; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 794; Ledeb. Fl. Ross. III, p.

429; Turczan. Fl. Baical.-Dahur. (1851) p. 404, no. 923; Herder, Pl. Radd. (1887) p. 42, no. 598; Крыл. Фл. Алт. IV (1907) p. 1065.

Pretty common in thickets and in slightly moist meadows on islets in the rivers Yenisei and Abakan, and on their banks, at Kushabar, and also near Ust Sisti-kem. The species begins flowering abut the middle of June. The specimens collected are characteristic in having the calyx-teeth comparatively long, as a rule somewhat longer than in the Norwegian specimens I have had for comparison. The length of the calyx-teeth is about 9 mm., and of the tube itself 4—5 mm.

Distribution: Europe, except the most northern and southern regions, Caucasia and south-western Asia, roughly to the Himalayas, Siberia, northwards to about 69½° north lat., northern Mongolia, North America (introduced). In eastern Asia partly replaced by the nearly allied species *L. petiolatum* Royle, with which it is often confounded.

Phlomis tuberosa L. Spec. Pl. ed. II (1763) p. 819; Ledeb. Fl. Alt. II, p. 412; Turczan. Cat. Baical. no. 908; Karel. et Kiril. Enum. Pl. Fl. Alt. 700; Ledeb. Fl. Ross. III, p. 437; Turczan. Fl. Baical.-Dahur. (1851) p. 405, no. 924; Herder, Pl. Radd. (1887) p. 45, no. 599; Крыл. Фл. Алт. IV (1907) p. 1068.

On the Abakan Steppe, on rocks, among low shrubs, in dry meadows, etc., near Ust Abakansk, and at Ust Kamuishto, scattered near Karatus and in the Urjankai country, at Ust Kamsara. On the Abakan Steppe the species begins flowering about the middle of June.

Distribution: Middle and south-eastern Europe, Caucasia and south-western Asia, southern Siberia, northwards to 60° north lat. (very rare in eastern Siberia), northern Mongolia.

Amethystea coerulea L. Spec. Pl. ed. II (1762) p. 30; Ledeb. Fl. Alt. I, p. 19; Turczan. Cat. Baical. no. 912; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 706; Ledeb. Fl. Ross. III, p. 441; Turczan. Fl. Baical.-Dahur. (1851) p. 407, no. 925; Herder, Pl. Radd. (1887) p. 47, no. 601; Крыл. Фл. Алт. IV (1907) p. 1073.

On rocks near the banks of the Yenisei, above Minusinsk, nearly past flowering at the beginning of September.

Distribution: From Russian Turkestan through southern Siberia to the Amoor Province, Manchooria, northern Mongolia, northern China.

Solanaceae Pers.

Solanum Dulcamara L. Spec. Pl. ed. II (1762) p. 226.

var. **persicum** (Willd.) Krylow, Крыл. IV (1904) p. 918. *S. persicum* Willd. in Roem. et Schult. Syst. Veg. IV, p. 662; Ledeb. Fl. Alt. I, p. 237; Turczan. Cat. Baical. no.

827; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 935; Ledeb. Fl. Ross. III, p. 187; Turczan. Fl. Baical.-Dahur. (1850) p. 529, no. 840; Herder, Pl. Radd. (1872) p. 562, no. 197.

Not unfrequent in moist thickets, etc., on islets in the Lower Abakan. Collected with flowers and buds at the end of June, and with nearly ripe fruits, near Kushabar, in the middle of July. In the Urjankai country I have met with this species in several places on the rivers Bei-kem and Ulu-kem.

In Siberia the above variety occurs nearly exclusively; it is recorded to differ from the typical plant by its entire leaves, with a cordiform base, being destitute of lobes. In the material brought home from Asia, there occur, however, specimens having one or several leaves incised at the base, on one side or on both, thus, much recalling the typical plant in the shape of the leaves. In my material, for the rest, there are to be found specimens agreeing in all characters with Norwegian ones, and there seemed to occur all intermediates between these 2 varieties. In the structure of the flowers and the berries, both varieties also seemed to agree perfectly. The leaves are always more or less, sometimes rather much hairy, especially so on the under sides.

Distribution: The species is distributed nearly all over Europe, except the most northern regions, Caucasia and south-western Asia to the Himalayas, Siberia, northwards to about 65½° north lat., eastwards to the Amoor Province, and throughout eastern Asia, northern Mongolia, Japan, North Africa. In Asia prevails var. *persicum*. The species also occurs in America, introduced from Europe.

Hyoscyamus niger L. Spec. Pl. ed. II (1762) p. 257; Ledeb. Fl. Alt. I, p. 228; Turczan. Cat. Baical. no. 828; Ledeb. Fl. Ross. III, p. 183; Turczan. Fl. Baical.-Dahur. (1850) p. 526, no. 837; Herder, Pl. Radd. (1872) p. 566, no. 200; Крыл. Фл. Алт. IV (1907) p. 915.

Pretty common all over the territory traversed of southern Siberia, where occurring in waste places in the outskirts of the towns and villages, in their streets and courtyards: at Minusinsk and Ust Abakansk, on declivities near the river, not far from Askys, at Ust Kamuishto, Karatus, and Kushabar. In full flower in June.

Distribution: Europe, except the most northern regions, Caucasia and south-western Asia to the Himalayas and Tibet, Siberia, northwards to about 59½° north lat., and eastwards to the Amoor Province, Manchooria, northern China, north-eastern Mongolia, Tibet, North Africa, North America (introduced from Europe).

Scrophulariaceae Lindl.

Verbascum Thapsus L. Spec. Pl. ed. II (1762) p. 252; Ledeb. Fl. Alt. I, p. 230; Ledeb. Fl. Ross. III, p. 193; Крыл. Фл. Алт. IV (1907) p. 921.

On dry mountain-sides at Kushabar; with young flowers at the beginning of July.

Distribution: Europe, except the most northern parts, Caucasia and south-western Asia to Tibet and the Himalayas, western Siberia to about the Yenisei, North America (introduced).

Linaria vulgaris (L.) Miller, Gard. Dict. ed. VIII (1768) no. 1; Turczan. Cat. Baical. no. 861; Ledeb. Fl. Ross. III, p. 206; Turczan. Fl. Baical.-Dahur. (1851) p. 300, no. 841; Herder, Pl. Radd. (1872) p. 572, no. 204; Крыл. Фл. Алт. IV (1907) p. 924. *L. acutiloba.* Fischer, Ledeb. Fl. Alt. II, p. 444; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 659.

It appears from the material collected that the species varies much, especially in the breadth of the leaves, which are partly 1-nerved, partly broader, and 3-nerved. Some specimens are very luxuriant, with stems up to 70—80 cm. high, glabrate, or more or less densely glandular. The density and the floweriness of the panicle is also much varying. The species occurs scattered on the Abakan Steppe, especially on the borders of fields, etc., at Askys, Ust Kamuishto, Kushabar, and in the Amyl valley, near Kalna. With flowers and flower-buds in June.

Distribution: Europe, except the extreme north and south, Caucasia and south-western Asia, Siberia, in the Yenisei valley northwards to 68½° north lat., and eastwards to the Amoor Province, northern Mongolia, Manchooria, Corea, China, Sakhalin. Introduced into North America.

Linaria odora (Marsch-Bieb.) Chavannes, Monograph. *Anthirrhin.* (1833) p. 136; Крыл. Фл. Алт. IV (1907) p. 926. *L. Loeselii* Ledeb. Fl. Alt. II, p. 447; Bunge, Enum. Alt. p. 51; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 661.

var. **major** Bunge in Ledeb. Fl. Alt. II, p. 448; Ledeb. Fl. Ross. III, p. 208; Крыл. l. c. p. 927.

Pretty common on the Abakan Steppe, where I have collected it in dry, stony places, on rocks, etc., near Ust Abakansk and near Askys, with flowers in the first half of June. The specimens collected have very narrow leaves, only about 1 mm. broad, and I therefore refer it to *f. angustifolia* Kryl. l. c.

Distribution: The species is distributed from northern Germany, through south-eastern Europe and south-western Asia, roughly to Pamir and Afghanistan, southern Siberia, eastwards to the Yenisei.

Scrophularia nodosa L. Spec. Pl. ed. II (1763) p. 863; Ledeb. Fl. Alt. II, p. 439; Ledeb. Fl. Ross. III, p. 218; Крыл. Фл. Алт. IV (1907) p. 930.

Of this one I have only some few specimens in my collections, taken among shrubs, and in waste places, near the village of Kushabar, and at Kalna. In full flower in the middle of July. The specimens collected have the corolla comparatively very small, being only 6 mm. long, and the calyx also seemed to be less deeply indented than is common in the Scandinavian material of comparison. The material, however, is, of course, so scarce that I have not been able to form a well-founded opinion on the systematic value of this character.

Distribution: Nearly all over Europe, except the most northern and southern parts, Caucasia and adjacent portions of Asia, Siberia, in the Yenisei valley, northwards to about 69° north lat., and eastwards roughly to the Yenisei.

Scrophularia incisa Weinm. Ind. Pl. Hort. Dorpat. (1810) p. 136; Ledeb. Fl. Alt. II, p. 442; Turczan. Cat. Baical. no. 860; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 657; Ledeb. Fl. Ross. III, p. 219; Turczan. Fl. Baical.-Dahur. (1851) p. 304, no. 843; Herder, Pl. Radd. (1872) p. 577, no. 209; Крыл. Фл. Алт. IV (1907) p. 931.

This species I have met with at Ust Abakansk, on dry, stony declivities, in flower in the first half of June.

Distribution: Southern Siberia, eastwards to Trans Baikal, south-western Asia, roughly to Pamir.

Limosella aquatica L. Spec. Pl. ed. II (1763) p. 881; Ledeb. Fl. Alt. II, p. 463; Turczan. Cat. Baical. no. 863; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 721; Ledeb. Fl. Ross. III, p. 226; Turczan. Fl. Baical.-Dahur. (1851) p. 307, no. 844; Herder, Pl. Radd. (1872) p. 583, no. 216; Крыл. Фл. Алт. IV (1907) p. 934.

On muddy river-banks near the outlet of the river Uibat into the Abakan, where occurring associated with *Scirpus acicularis*. In flower and partly done flowering in the last days of June.

Distribution: All over Europe, except the southern parts, temperate regions of Asia, northwards to past 70° north lat., North and South America, Greenland, Australia, South Africa.

Veronica pinnata L. Mantissa p. 24; Ledeb. Fl. Alt. I, p. 33 (excl. syn.); Karel. et Kiril. Enum. Pl. Fl. Alt. no. 665; Ledeb. Fl. Ross. III, p. 230; Herder, Pl. Radd. (1883) p. 369, no. 478; Крыл. Фл. Алт. IV (1907) p. 939.

The segments of the leaves in the specimens collected are very narrow, only about 0,5, rarely to 1 mm. broad, the spike-like raceme solitary, rather long and densely flowered. The stems are high, about 20—25 cm., sparingly puberulent. I reckon these specimens to *f. vulgaris* Krylow, l. c. (1907) p. 939. Not uncommon on the Abakan Steppe, near Askys, at Ust Kamuishto, and in the neighbourhood of Minusinsk, near Buistraya, at Tagarski osero, and also on the steppes on the Bei-kem, near the outlet of the Tapsa. Especially occurring in dry, grass-grown places, on rocks, among sand, etc. With young flowers in the second half of June.

Distribution: Russian Turkestan, southern Siberia, eastwards to about the Yenisei, northern Mongolia.

Veronica spicata L. Spec. Pl. ed. II (1762) p. 14; Ledeb. Fl. Alt. I, p. 30; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 664; Ledeb. Fl. Ross. III, p. 233; Крыл. Фл. Алт. IV (1907) p. 942.

On dry hill-slopes near Askys. With flowers in the middle of June.

Distribution: Europe, except the northern and most southern parts, Caucasia and south-western Asia, southern Siberia, eastwards roughly to the Yenisei, northern Mongolia.

Veronica incana L. Spec. Pl. ed. II (1762) p. 14; Ledeb. Fl. Alt. I, p. 32; Turczan. Cat. Baical. no. 864; Ledeb. Fl. Ross. III, p. 235; Turczan. Fl. Baical.-Dahur. (1851) p. 313, no. 849; Herder, Pl. Radd. (1883) p. 377, no. 481; Крыл. Фл. Алт. IV (1907) p. 942.

Most of the specimens collected are distinguished by having the under sides of the leaves considerably more densely tomentose than the upper sides, which, accordingly, are of a more greenish colour. The spike is solitary, rather loosely flowered below, with comparatively long bracts; the flowers are closer above, and with shorter bracts, equalling or shorter than the calyx.

Besides this one, I have collected, near Tagarski osero, some specimens of a form distinguished by being densely tomentose all over the plant, so that it has the appearance of being nearly snow-white. The upper sides of the leaves are as densely hairy as the under sides. These specimens are also distinguished by having the bracts comparatively longer, always exceeding the calyx, the lower ones sometimes rather much so. The structure of the flowers, for the rest, agrees perfectly in both forms. The corolla is in both of them of one blue colour when dried; it appears, however, from the boiling out of the flowers — which I have undertaken for the purpose of examining their structure — that the corolla assumes a light blue ground colour, with small, regular, roundish-ovate spots of a deeper blue.

This species is scattered over the territory traversed, on dry hills and in dry meadows, frequently in sandy places, on rocks, etc. Near Ust Abakansk, at Askys, and also at Tagarski osero I have collected it with young, partly opened flowers at the end of June and the beginning of July. In the Urjankai country I have met with the species rather frequently in the steppe and wooded steppe regions, viz. in dry, sandy woods of larch and pine at Ust Sisti-kem, at Ust Kamsara, and near Bjelosarsk, past flowering at the end of August.

Distribution: South-eastern Europe, Caucasia, and adjacent portions of Asia, southern Siberia, except the more eastern parts.

Veronica pseudolongifolia nov. spec. [Tab. X, Fig. 2, Tab. XI].

Rhizoma lignosa, fere horizontalis. Caulis erectus ad 1 m. altus, teres, inferne omnino glaber, superne et praecipue in racemo plus minus puberulus. Folia sessilia vel brevissime petiolata, opposita vel terna, ovato-lanceolata — longe-lanceolata, prope basin vulgo latissima, rotundata aut cordata, superne sensim attenuata, apice acuminata, margine dense et argute serrata, rarius duplicato-serrata, fere glabra, interdum subtus, praecipue secundum nervos leviter puberula, glandulosa. Racemus terminalis, solitarius vel subpaniculatus, densiflorus, 5—8 cm., fructifer ad 15 cm. longus. Pedicelli breves, circiter 1 mm. longi, puberuli. Bracteae parvae, lanceolatae vel fere lineares, apice subacutae, pedicellis fere aequilongi vel paullo longiores, apicem calycis numquam superantes, infimae interdum foliaceae et aliquanto longiores, glabrae vel marginibus leviter glandulosis, nervis carentes. Calyx quadripartitus, laciniis uiformibus, ovatis, apice plus minus subacutis marginibus leviter glandulosis, capsula fere dimidio brevior. Corolla

coerulea, circiter 6 mm. longa, laciniis late ovatis, lacinia superiore ceteris aliquanto latiore. Tubus corollae 3—4 mm. longus, dense tomentosus. Stamina glabra, prominentia. Capsula compressa, obcordata, glabra, apice distinctius emarginata. Stylus capsula multo longior, semina 0,5 mm. longa, glabra.

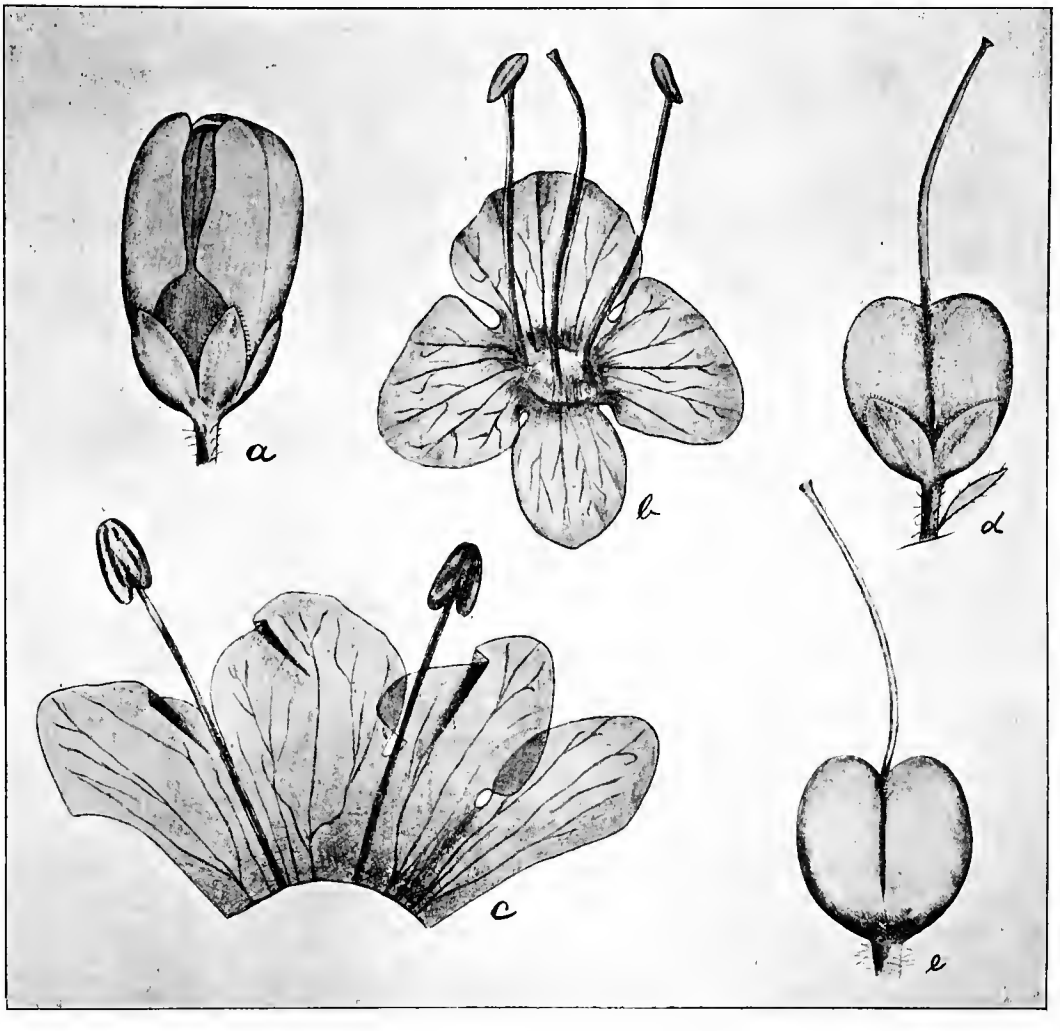

Fig. 105. *Veronica pseudolongifolia* nov. spec. a. Flower-bud (9/1). — b. Flower, seen from above, the limb somewhat flattened. — c. Corolla, opened and expanded. — d. Capsule, with calyx, pedicel, and bract. — e. Capsule, the calyx removed (7,5/1).

In point of external habitus, the present plant very much recalls *Veronica longifolia* L., with which it is likely to be confounded on a superficial view, and with which it is, indeed, very nearly allied, showing like this one, as well, very considerable variations, above all in the shape and size of the leaves, the pubescence, floweriness, and the like. Especially in the leaves there is a great conformity between these 2 species; but they are

very distinctly separated by the fact that in *Veronica pseudolongifolia* they are practically sessile, or only very short-petioled, the petiole to about 1—2 mm. long. This character especially distinguishes our plant. The lower leaves are ovate-lanceolate, the upper ones gradually narrower, lanceolate or oblong-lanceolate, generally 5—6 times as long as broad, acuminate at the apex; the base is rounded or subcordate, whereby the leaves become frequently nearly clasping the stem, never cuneately tapering towards the base, as is the case in *V. spuria* L., which it recalls by the short bracts and the subacute calyx-lobes. The margin of the leaves is sharply and coarsely serrate, with appressed

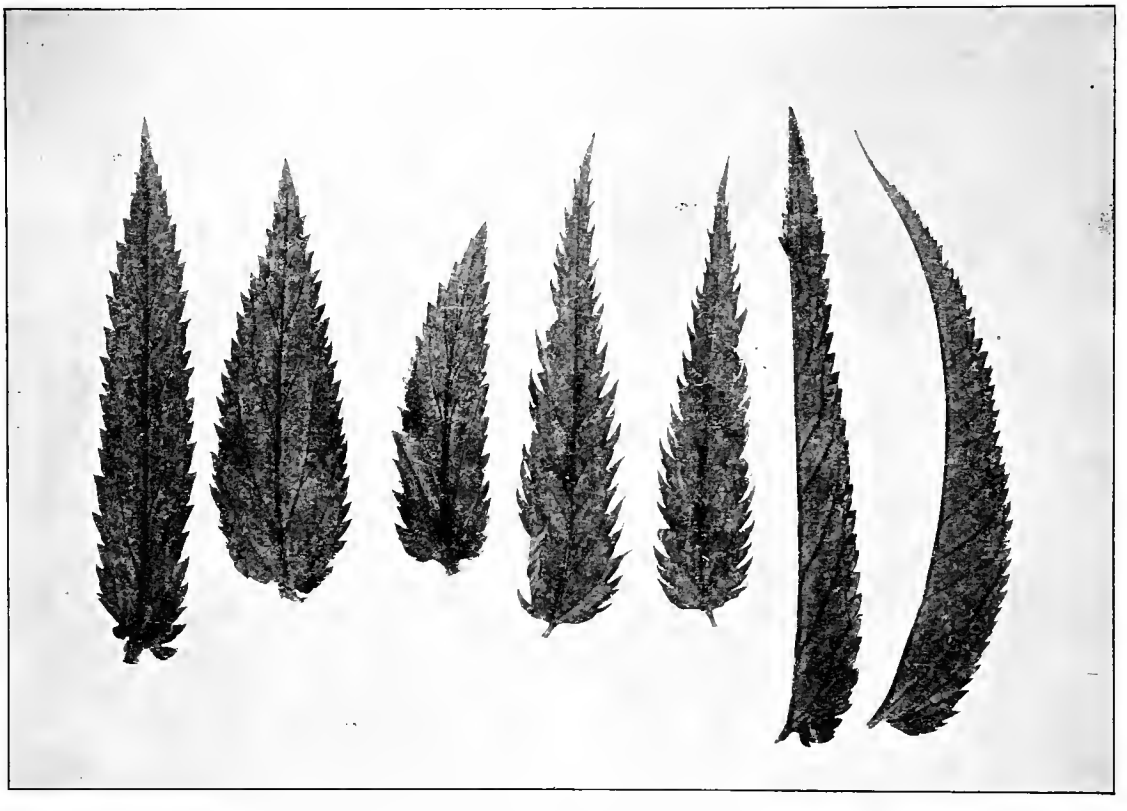

Fig. 106. *Veronica pseudolongifolia* nov. spec. Different types of leaves, with complete petioles, the two on the right hand side conduplicate (1/1).

teeth; only rarely the margin may be slightly duplicate-serrate. There occur sometimes specimens in which the apex of the leaf is entire or nearly so. The leaves are commonly opposite, or verticillate in 3's; more than 3 leaves in each node have not been found by me in any of the specimens collected. The middle stem-leaves are 1,5—2 cm. broad, and 7—10 cm. long when full-grown; of more rare occurrence are narrow-leaved specimens, the leaves of which are only about 1 cm. broad. There occur frequently specimens with nearly rectangularly spreading leaves, distinctly conduplicate, so as to exhibit a form parallel to *f. complicata*, of the nearly allied species *V. longifolia*. Some of the

specimens collected have narrower and rather deeply serrate leaves, much recalling *f. maritima* of the said species. The leaves are completely glabrous, only rather rarely slightly hairy on the under side, especially so along the veins. The stem is erect and rather stout, round, glabrous below, more or less puberulent above, being also hairy below, but only about the nodes. The spike-like raceme is rather densely flowered, solitary or several, about 5—8 cm. long, when fructiferous frequently somewhat prolonged, to 15 cm. long. The pedicels are short, about 1 mm. long, sparingly pubescent. The bracts lanceolate to linear, nerveless, short, of about the same length as the pedicels, and, save for the lower ones, which may sometimes be foliaceously developed, never reaching up to the top of the calyx. The calyx-lobes are always of equal size, fully 1 mm. long, nearly ovate, subobtuse or subacute at the apex, nerveless, glabrous, and beset with scattered, short, glandular hairs at the margin, never lanceolate and as distinctly acuminate as in *V. longifolia*. The corolla is of an azure colour, about 4 times as long as the calyx; its lobes are suborbicular to broadly ovate, the upper one somewhat broader than the rest. The tube of the corolla is rather densely villous within. The stamens are glabrous, protruding. The capsule is compressed, nearly obcordate, 3—4 mm. long, thus exceding rather considerably the calyx-lobes, glabrous. The style is much protruding, 6—7 mm. long. When dried this plant often assumes a dark, brownish red colour, and especially the upper parts of the plants being often of a nearly chocolate colour.

It appears from the description given above that our plant, especially in the shape of the calyx-lobes and the shorter bracts, is also rather closely connected with *V. spuria*, from which, however, it is distinctly separated by the shape of the leaves, being always broadest near the base, and never cuneately tapering towards the petiole; the flower cluster is, besides, more densely flowered than is usual in that species. Of *V. pseudolongifolia* I have collected a rather rich material from various localities in the territory traversed, and all of the specimens are quite agreeable to the characters pointed out above. Also from more northerly regions in the Yenisei valley, in latitude of about 60°, I have received specimens precisely corresponding to my *V. pseudolongifolia*, which, accordingly, are indications that this new species is rather widely distributed in northern and middle Asia. In the herbarium of the Imperial Botanical Gardens in Petrograd I have found, under the name of *Veronica longifolia* L., Siberian specimens agreeing perfectly with the species described above. To judge from a cursory examination, which I have undertaken of the material of the said herbarium, *V. pseudolongifolia* seemed to extend through Siberia, westwards to about the government of Tomsk. Its nearest relations are no doubt the European *V. longifolia* and *V. spuria*. None of these, however, is to be found in my material, and *V. pseudolongifolia* is therefore, possibly, the one substituting these species in this part of Siberia.

The above species is very common in thickets, etc., on the islets in the rivers Yenisei and Abakan, where I have collected it with young, generally not yet opened flowers in June. Specimens partly full-blown and partly done flowering have been collected

by me about Kushabar, in several places in the Amyl valley. In the Urjankai country the species also seemed to be rather frequent; thus, I have collected it in thickets at Ust Algiac, in several places near the river, and at Ust Sisti-kem.

Veronica Anagallis L. Spec. Pl. ed. II (1762) p. 16; Ledeb. Fl. Alt. I, p. 37; Turczan. Cat. Baical. no. 873; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 667; Ledeb. Fl. Ross. III, p. 236; Turczan. Fl. Baical.-Dahur. (1851) p. 315, no. 851; Herder, Pl. Radd. (1883) p. 380, no. 482; Крыл. Фл. Алт. IV (1907) p. 943.

On the banks of a small river near Ust Kamuishto; flowering in the middle of June.

Distribution: Europe, except the most northern regions, Caucasia, south-western and central Asia, Siberia, northwards to 61° north lat., and eastwards to Kamtchatka, eastern Asia, Africa, North America.

Veronica Teucrium L. Spec. Pl. ed. II (1762) p. 16; Turczan. Fl. Baical.-Dahur. (1851) p. 316, no. 853.

var. **dentata** (Schm.) Koch, Крыл. Фл. Алт. IV (1907) p. 946. *V. dentata* Schmidt, Bohem. Cent. I (1793) p. 20. *V. austriaca* L. *α dentata* Ledeb. Fl. Ross. III, p. 238. *V. Teucrium* L. *γ angustifolia* Ledeb. Fl. Alt. I, p. 40; Herder, Pl. Radd. (1883) p. 390, no. 485.

Scattered on the Abakan Steppe, in dry thickets, on sunny hills, and along dried up brooks, etc., near Askys and Ust Kamuishto. The leaves in the specimens collected do not exceed 1 cm. in breadth; they are equally narrow, tapering towards the base, and densely and rather deeply serrate at the margin. The pedicels are always longer than the bracts, generally 8—12 mm. long. Collected flowering already at the beginning of June, and with ripe fruits at the end of the same month.

Distribution: The species is distributed in middle and south-eastern Europe, Caucasia with adjacent parts of Asia, southern Siberia, eastwards roughly to Lake Baikal.

Veronica Chamaedrys L. Spec. Pl. ed. II (1762) p. 17; Ledeb. Fl. Ross. III, p. 243; Крыл. Фл. Алт. IV (1907) p. 947.

The specimens collected are, above all, characteristic by their much prolonged racemes, which may reach up to 25 cm. in length, and are beset with numerous scattered flowers, to 30 in number. In some few specimens the peduncle proves to be 2-ramified at the base, and each branch attaining about the same length, it seems as if 2 racemes start from each axil. The flowers are rather long-pedicelled — the pedicels generally 6—10 mm., equalling or exceeding the axillary leaves. The sepals are comparatively large, 5—7 mm., equalling or exceeding the axillary leavbi-or tri-laterally pubescent, and others — at any rate above — universally hairy. On account of the comparatively scarce material, I dare not express any opinion on the systematic value of the said characters.

This species is very rare in Siberia, where hitherto only known from the most western parts, viz. the governments of Tobolsk and Tomsk, and here only from rather few

localities. It is recorded neither by HERDER nor TURCZANINOW. In the territory explored, the species also seemed to be rare; I have, at least, only met with it at Kushabar, in meadows and thickets near the village, which, accordingly, represents its most eastern range as yet known, where, however, it was rather frequent. Collected in flower, and partly with fruits in the middle of July.

Distribution: Europe, except the extreme south, Caucasia, Asia Minor, Syria, Siberia, eastwards roughly to the Yenisei, the Canary Islands, North America (naturalized).

Veronica agrestis L. Spec. Pl. ed. II (1762) p. 18; Ledeb. Fl. Ross. III, p. 254.

As a weed, near Kushabar; flowering at the beginning of July.

Distribution: Throughout Europe and Russian Asia, North America (introduced).

Veronica arvensis L. Spec. Pl. ed. II (1762) p. 18; Ledeb. Fl. Ross. III, p. 249.

In court-yards in the Amyl valley, at Petropawlowsk and Kalna; flowering in the middle of July.

Distribution: Throughout Europe and Russian Asia, North America (naturalized).

Veronica sajanensis nov. spec. [Tab. XII].

Radix crassa, lignosa. Caulis crassus, validus, erectus, simplex, 60-70 cm. altus, teres, leviter quadrangulus, praecipue parte superiore dense puberulus, glandulosus. Folia opposita vel terna, sessilia, 2-2,5 cm. lata, 5-7 raro ad 9 cm. longa, anguste ovata — late-lanceolata, basi rotundata, superne sensim attenuata et longe acuminata, margine argute et dense serrata, interdum fere duplicato-serrato, utrimque sparse pilosa, glandulosa, infima plus minus deminuta ad squamas sensim redacta. Racemus terminalis, erectus, semper simplex, densiflorus, 9-11 cm. longus, circiter 1-1,5 cm. latus, aequilatus, cylindratus. Pedicelli breves sed distincti, 1-1,5 mm. longi. Bracteae lineares, calyci aequilongi vel longiores, inferiores fere multo longiores. Calyx quadripartita, laciniae aequales, angustissimae, acutiusculae, fere lineares, 5-6 mm. longae aeque ac bracteae et pedicelli tomentosae. Corolla pallide coerulea, profundissime fissa, laciniae 4 angustae, lineari-cuneatae, ad apicem sensim attenuatae, calyci aequilongae vel aliquanto longiores, in faucibus dense et longe pilosae. Lacinia superior latior, sectionibus profundis a ceteris 3 perspicue descripta, 3-nervata, inferiores 3 ad basin plus connatae et nervo medio distincto singulae praeditae. Stamina longius prominentia calyce paene duplo longiora. Stylus prominens staminibus aequilongus vel aliquanto brevior. Capsula a latere compressa, orbiculata vel late elliptica, apice subemarginata, dense et longe villosa, 3 mm. longa.

This plant is represented in my collection by 2 specimens only, taken in subalpine tracts in the Altaian, where it was found in full flower July 28th.

It is a very characteristic and conspicuous species, which can hardly be confounded with any other species of *Veronica*. In point of external habitus it is already

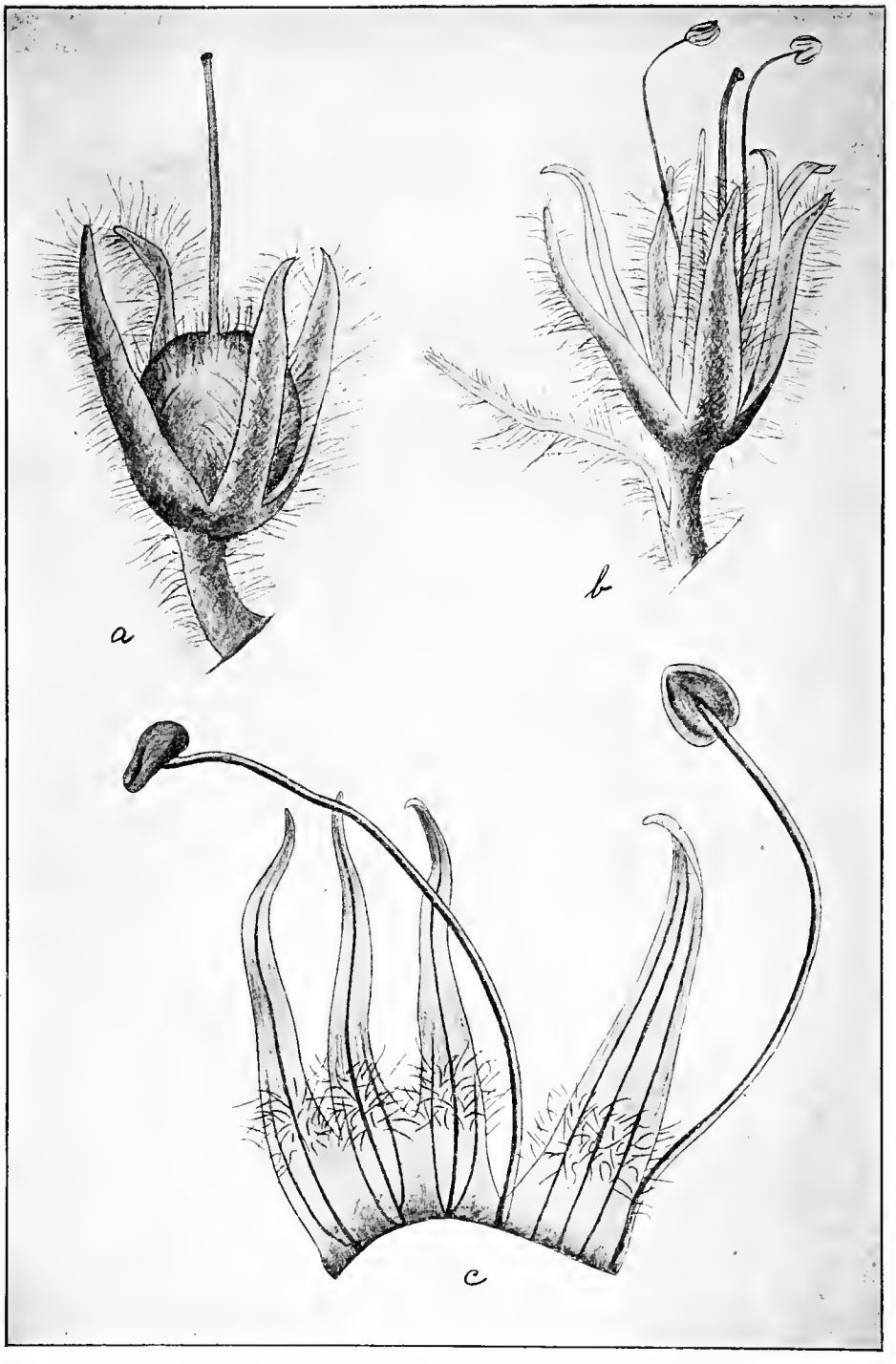

Fig. 107. *Veronica sajanensis* nov. spec. a. Capsule, with calyx and pedicel. — b. Perfect flower, with pedicel and bract. — c. Corolla, opened and expanded ($^{10}/_{1}$).

remarkable by the fact that all the flowers in the dense, spike-like raceme seemed to bloom nearly simultaneously, not in ascending succession. In the flowering season the whole raceme becomes, as a consequence, equally thick throughout its length, accordingly nearly cylindrical, not tapering upwards, as is common in the genus, and whereby the flower cluster assumes an appearance much recalling the one to be found in the nearly allied genus *Wulfenia*, which our plant also recalls in other respects. The rather long and coarse hairs covering the bracts, the pedicels and the calyx, give the raceme a greyi h-woolly appearance.

The stem is simple, 60—70 cm. high, strict and stout, round, or slightly quadrangular. In the lower part it is sparingly, in its upper part more densely puberulent and glandulous. These glandular hairs are rather long and pluricellular, but the glands themselves are very small, and it is only after a microscopic examination I have been able to make them out with certainty as real, glandular hairs. By means of a common magnifying glass only, the heads themselves are not easily visible. The leaves are opposite or verticillate in 3's, completely sessile, and on both sides sparingly hairy, and glandulous. The leaves are generally 5—7, rarely to 9 cm. long, and 2—2,5, rarely 3,5 cm. broad, oblong-ovate to lanceolate, with a rounded base, partly clasping the stem, tapering and acuminate at the apex, rather densely and sharply serrate, at times duplicate-serrate at the margin. The raceme is terminal and solitary, 9—11 cm. long, and rather densely flowered. The flowers are shortly pedicelled, the length of the pedicels being about 1—1,5 mm. The bracts are very narrow, linear-subulate, the lower ones generally a little longer than the calyx, the others generally equalling the calyx or only slightly exceeding it. The calyx is split nearly to the base into 4 lobes, which are uniform, very narrow and linear, tapering upwards, and acuminate, 5—6 mm. long, and, like the bracts and the pedicels, rather densely villous, giving the whole flower cluster a greyish-woolly appearance. While the stem itself is rather densely glandulous, the raceme seemed to be nearly destitute of glandular hairs. The corolla is split above into 4 very narrow, linear lobes, generally a little exceeding the calyx, all but linear, tapering upwards from the base, acuminate at the top, and generally furnished with a distinct midnerve; the hindmost lobe is somewhat broader, 3-nerved, and is, by deeper incisions, distinctly apart from the other 3, which are more united at the base. The tube is very short, only about 1 mm. long; the throat rather densely pilose within. In the dried specimens the corollas are pallid and discoloured, some of them, however, being of a pale blue, which is probably their natural colour. The stamens, with the yellow anthers, are protruding, about 8 mm. long. The style, too, protrudes beyond the corolla, but is, as a rule, somewhat shorter than the stamens. The capsule is 3—4 mm. high, distinctly shorter than the calyx, compressed, suborbicular or slightly oblong, obtuse, sometimes nearly imperceptibly emarginate at the summit, rather densely villous, especially so near the margin. In point of external habitus this species somewhat resembles *V. sibirica* L., but is very distinct by the structure of the flowers, and by the leaves, which, in *V. sibirica*, are verticillate in 6's—9's. It also probably belongs to quite another section of the genus.

Veronica serpyllifolia L. Spec. Pl. ed. II (1762) p. 15; Ledeb. Fl. Alt. I, p. 36; Turczan. Cat. Baical. no. 872; Ledeb. Fl. Ross. III, p. 248; Turczan. Fl. Baical.-Dahur. (1851) p. 318, no. 855; Herder, Pl. Radd. (1883) p. 404, no. 492; Крыл. Фл. Алт. IV (1907) p. 949.

Pretty common in grass-field, near Kushabar, on the banks of the Amyl, near Semiretska and Kalna, at Ust Algiac, and near Ust Sisti-kem. Collected flowering in July, and with fruits at the end of July and in August.

Distribution: Europe, except the extreme southern portions, south-western Asia to the Thian-Shan and the Himalayas, Siberia, northwards to 63° north lat., and eastwards to Kamtchatka, Manchooria, Corea, China, North Africa, North and South America, Australia.

Euphrasia tatarica Fischer in Sprengel, Syst. Veget. II (1825) p. 777; Wettstein, Monogr. Gatt. *Euphrasia* (1896) p. 88. *E. officinalis* L. *β vulgaris* Ledeb. Fl. Ross. III, p. 263; Herder, Pl. Radd. (1883) p. 41, no. 500. *E. officinalis* L. *β tatarica* (Fischer) Krylow, Фл. Алт. IV (1907) p. 955. *E. officinalis* Ledeb. Fl. Alt. II, p. 422; Turczan. Cat. Baical. no. 835; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 644; Turczan. Fl. Baical.-Dahur. (1851) p. 324, no. 858.

This species has been collected by me on dry hill-sides near Kushabar, where flowering in the middle of July. This small-flowered species is very nearly allied to *Euphrasia latifolia* Pursch, occurring in arctic America and arctic Europe.

Distribution: Southern and middle Europe, Caucasia, and south-western Asia to Tibet and the Himalayas, Siberia, eastwards to the Amoor Province, Manchooria, Corea, northern Mongolia.

Euphrasia hirtella Jordan in Reuter, Compt. Rend. Soc. Haller IV (1854—56) p. 120; Wettstein, Monogr. Gatt. *Euphrasia* (1896) p. 175. *E. officinalis* L. *α latifolia* Ledeb. Fl. Ross. III, p. 263; Herder, Pl. Radd. (1883) p. 43 ex parte. *E. tatarica* Ledeb. Fl. Alt. II, p. 423 (non Fischer). *E. officinalis δ hirtella* (Jordan) Krylow, Фл. Алт. IV (1907) p. 956.

On hill-slopes at Kushabar, partly together with the preceding one, and in the Amyl valley, at Kalna. In flower in the middle of July.

Distribution: Southern and middle Europe, south-western Asia, Siberia, northern Mongolia. In the extreme east of Asia it is replaced by the nearly allied *Euphrasia amurensis* Freyn.

Euphrasia Jaeschkei Wettstein, Monogr. Gatt. *Euphrasia* (1896) p. 80 (incl. *E. Regelii* Wettstein, l. c. p. 81).

E. Jørgensen, the noted student of *Euphrasia*, who has revised my material of this genus, makes the following observation on the specimens: „They do not agree very well with Wettstein's description (of specimens from the Himalayas), but ought scarcely to be entered as a distinct form or species, as the defective description in Wettstein is evidently due to scarcity of material. Besides, the natural species, no doubt, also com-

prises WETTSTEIN's *E. Regelii*, which is more widely distributed in Asia, but all of your specimens bear flowers of the larger type, whereby corresponding to *E. Jaeschkei*. As the latter has been described after alpine specimens, it bears rather the character of an early summer type; your specimens no. 1140 (from islets in the river Abakan) were so far more typical." According to WETTSTEIN's description, there is no other esential difference between *E. Regelii* and *E. Jaeschkei* than the latter bearing larger flowers (the corolla 8—10 mm. along the back; in *E. Regelii* 5—6 mm.). The specimens collected by me agree best with the description of *E. Jaeschkei*, by the size of the corolla being ± 8 mm., moreover, by the stem being glandular, and the bracts having the teeth mucronulate. It would perhaps be as right to consider *E. Regelii*, with its wider distribution (from the Caucasus, Persia, the Himalayas, Tibet and Turkestan — according to WETTSTEIN), as the main species, and the specimens with larger flowers as *E. Regelii var. Jaeschkei*. The species at hand is evidently rather nearly allied to the European *E. brevipila*, and *E. stricta*.

In grass-field on the islets in the river Abakan, above Uibat, and about Kushabar. In full flower at the end of June and the beginning of July.

Distribution: *E. Regelii* WETTSTEIN occurs in the Caucasus, Persia, the Himalayas, Tibet and Turkestan, while the typical *E. Jaeschkei* WETTSTEIN is previously known only from the Himalayas.

Note. In my diaries I have, besides, noted species of *Euphrasia* from various places in the Amyl valley, from Ust Algiac, and Ust Sisti-kem.

Fig. 108. *Euphrasia Jaeschkei* WETTSTEIN (1/1).

Odontites rubra Gilib. Fl. Lith. II (1781) p. 126; Ledeb. Fl. Alt. II, p. 424; Turczan. Cat. Baical. no. 836; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 645; Ledeb. Fl. Ross. III, p. 261; Turczan. Fl. Baical.-Dahur. (1851) p. 322, no. 857; Herder, Pl. Radd. (1883) p. 38, no. 499; Крыл. Фл. Алт. IV (1907) p. 952.

At Ust Tapsa, in waste places; past flowering and with ripe capsules at the end of August.

Distribution: Throughout Europe, except the most northern parts, Caucasia and south-western Asia to Cashmere and the Thian-Shan, temperate parts of Siberia, northern Manchooria, northern Mongolia, North Africa, North America (naturalized from Europe).

Cymbaria daurica L. Spec. Pl. ed. II (1763) p. 861; Turczan. Cat. Baical. no. 864; Ledeb. Fl. Ross. III, p. 264; Turczan. Fl. Baical.-Dahur. (1851) p. 325, no. 859; Herder, Pl. Radd. (1883) p. 66, no. 501.

Scattered on the steppes about the rivers Yenisei and Abakan, where collected by me with flowers in the first half of June.

Distribution: Eastern Siberia, roughly from the Yenisei to the west, Mongolia, northern China.

Alectorolophus major (Ehrh.) Reichenb. Ic. Pl. Crit. VIII (1830) p. 975. *Rhinanthus Crista galli* L., Ledeb. Fl. Ross. III, p. 265; Herder, Pl. Radd. (1883) p. 61, no. 502; Крыл. Фл. Алт. IV (1907) p. 957. *A. Crista galli* (L.) Marsch.-Bieb. Fl. Taur. Cauc. II, p. 68; Ledeb. Fl. Alt. II, p. 419; Turczan. Cat. Baical. no. 830; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 642. *R. major* Ehrh. Beytr. VI, p. 144; Turczan. Fl. Baical.-Dahur. (1851) p. 326, no. 860.

It appears from the material collected that the species is rather polymorphous in the territory explored, where there occur both branched and unbranched specimens. In the first mentioned ones the branches are erect or ascending, shorter than the stem, whereby the form recalls *f. typicus* Neuman, but they differ from his description by the fact that there are commonly several pairs of leaves between the upper ramification and the lowest flowers on the main axis. The ripe seeds are distinctly winged. On islets in the river Abakan, near Uibat, I have collected young, not yet flowering specimens distinguished by their very large leaves, of equal breadth throughout their length, to 8 cm. long, and 1,3 cm. broad.

Pretty common in moist meadows, along borders of fields, and the like, in the territory explored. On the Abakan Steppe I have collected it near Ust Abakansk, and at Askys, moreover at Kushabar, Ust Algiac, Ust Sisti-kem, and near the Dora Steppe. The species begins flowering on the Abakan Steppe in the middle of June. With ripe fruits at the beginning of August.

Distribution: Nearly all over Europe, except the extreme south, Caucasia and south-western Asia to Turkestan, Siberia, northwards to the Arctic circle, and eastwards to Trans Baikal, northern Mongolia, North America, Greenland.

Pedicularis amoena Adams. ex Steven, Monogr. *Pedicul.* in Mem. Soc. H. N. Moscou (1822) VI, p. 25; Bunge, Enum. Alt. p. 45; Turczan. Cat. Baical. no. 845; Ledeb. Fl. Ross. III, p. 271; Turczan. Fl. Baical.-Dahur. (1851) p. 332, no. 865; Herder, Pl. Radd. (1883) p. 73, no. 507; Крыл. Фл. Алт. IV (1907) p. 965. *P. verticillata* Ledeb. Fl. Alt. II, p. 427.

In the Altaian, in alpine grass-fields, among stones and gravel. In full flower at the end of July.

Distribution: Northern Russia, arctic Siberia, eastwards right up to Behring's Ocean, the Thian-Shan, the Altai, the Sayansk district, the Himalayas.

Pedicularis myriophylla Pall. It. III, p. 331, 446, app. p. 737, no. 99; Bunge, Enum. Alt. p. 45; Turczan. Cat. Baical. no. 841; Ledeb. Fl. Ross. III, p. 274; Turczan. Fl. Baical.-Dahur. (1851) p. 328, no. 861; Herder, Pl. Radd. (1883) p. 69, no. 504; Крыл. Фл. Алт. IV (1907) p. 967.

On stony declivities and meadows in the Altaian, about the tree limit; in flower in the last days of July.

Distribution: Eastern Altai and Sayansk mountains, northern Mongolia.

Pedicularis uncinata Steph. in Willd. Spec. Pl. III, p. 213; Ledeb. Fl. Alt. II, p. 431; Bunge, Enum. Alt. p. 46; Turczan. Cat. Baical. no. 850; Ledeb. Fl. Ross. III, p. 280; Turczan. Fl. Baical.-Dahur. (1851) p. 345, no. 879; Herder, Pl. Radd. (1883) p. 75, no. 509; Крыл. Фл. Алт. IV (1907) p. 970.

Not uncommon on open, wooded mountain slopes, and the like, in the subalpine tracts of the Sayansk mountains: near Kushabar, in the Amyl valley, at Ust Algiac, Ust Sisti-kem, and in the Altaian. Collected flowering and partly with capsules in July and the first half of August.

Besides the typical species, I have collected, in subalpine wooded tracts in the Altaian, about the Upper Sisti-kem, a series of specimens differing in various characters from the typical plant. I separate the latter under the name of

subspec. **subalpina** nov. subspec. [Tab. XIII, Fig. 1].

Ab forma typica praecipue differt pedicellis longioribus, laciniis calycis multo longioribus, acutioribus, impari longitudine, bracteis majoribus et longioribus, interdum foliaceis. Lobi labii inferioris apice leviter emarginati, ciliati, non ut in forma typica obtusi.

It is chiefly by the rather long, unequal calyx-lobes, distinctly acuminate or even mucronate at the top, by the long, sometimes foliaceous bracts, by comparatively longer pedicels, and the 3 lobes of the lower lip being slightly emarginate that this subspecies differs from the typical plant. The stem is furnished at the base with large, withering, membranous, brown leaf-sheaths or scales, to 2—3 cm. long. The petioles of the basal leaves are about ½ as long as the blade, the upper leaves more shortly petioled, the uppermost ones sessile. The leaves are also gradually decreasing in size up the stem, passing by degrees into the bracts, of which the lower ones, at any rate, are large and foliaceously developed. The segments of the leaves are lanceolate, generally somewhat broader and closer

than in the typical species, sharply serrulate at the margin. The flowers have short, but distinct pedicels to 5 mm. long, distinctly striate, glabrous or sparingly puberulent. The calyx rather deeply split into 5 long, linear lobes of unequal length, acute or mucronulate at the top, frequently rather much surpassing the tube in length, glabrous or sometimes ciliate. The 3 lobes of the lower lip are slightly emarginate at the top, not rounded as in the typical species, slightly ciliate. The style is rather much projecting. The lower bracts are foliaceously developed, gradually decreasing in size upwards, but always considerably longer than in the typical species, and much exceeding the calyx, generally ciliate at the base, glabrous for the rest. Save for the raceme proper, the stem and the

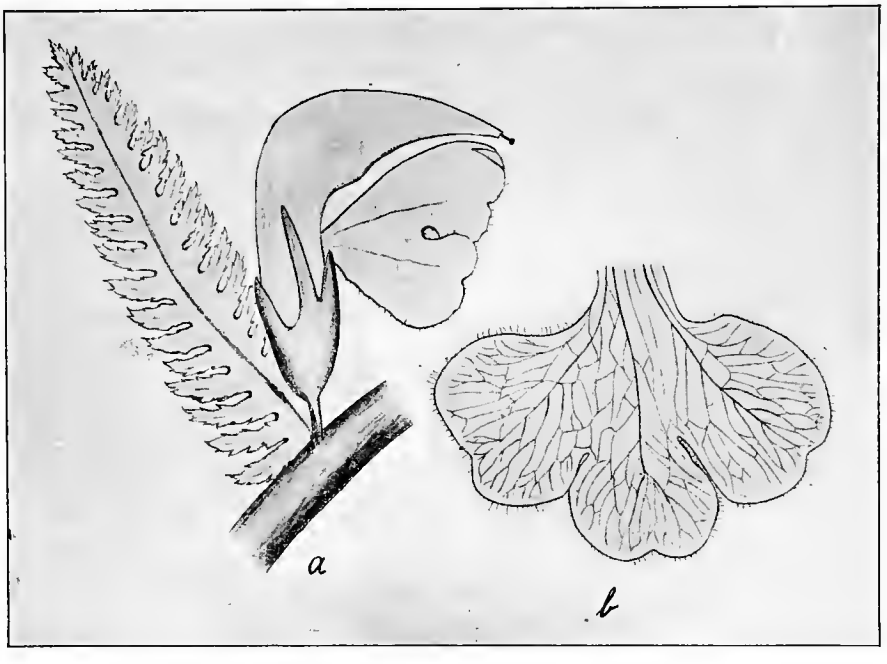

Fig. 109. *Pedicularis uncinata* Steph. subspec. *subalpina* nov. subspecies. a. Perfect flower, with pedicel and bract. — b. Lower lip, expanded (4/1).

leaves are completely glabrous, more or less shining, when pressed, at any rate, nearly black. Collected in full flower at the end of July, in the Altaian, on subalpine mountain slopes, near the tree limit.

Distribution: The species is distributed in Siberia, from the eastern part of the Altai and in the Sayansk mountains, northwards to towards 71° north lat., eastwards to Trans Baikal, northern Mongolia.

Pedicularis resupinata L. Spec. Pl. ed. II (1763) p. 846; Ledeb. Fl. Alt. II, p. 429; Turczan. Cat. Baical. no. 849; Ledeb. Fl. Ross. III, p. 281; Turczan. Fl. Baical.-Dahur. (1851) p. 349, no. 884; Herder, Pl. Radd. (1883) p. 79, no. 513; Крыл. Фл. Алт. IV (1907) p. 972.

On the islets in the Lower Abakan, in moist thickets, and in meadows, where I have collected young, flowerless specimens in June. The species is also rather common in the Amyl valley, where I have taken it near Semiretska and at Kalna, in moist thicket of foliage trees, etc., in full flower about the middle of July. In the Urjankai country I have collected the species near Ust Algiac, and in thickets on flood-plains at Ust Tara-kem.

Distribution: Siberia, from the Ural to Kamtchatka, and northwards to 66½° north lat., Mongolia, Manchooria, Corea, northern China, Sakhalin, Japan.

Pedicularis palustris L. Spec. Pl. ed. II (1763) p. 845; Ledeb. Fl. Alt. II, p. 428; Turczan. Cat. Baical. no. 847; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 648; Ledeb. Fl. Ross. III, p. 283; Turczan. Fl. Baical.-Dahur. (1851) p. 334, no. 867; Herder, Pl. Radd. (1883) p. 83, no. 518; Крыл. Фл. Алт. IV (1907) p. 974.

Pretty common in swampy meadows and thickets on the islets in the river Abakan, where I have collected specimens as yet flowerless in the second half of June. In the Urjankai country I have met with the species at Ust Tara-kem, where occurring near the river, in moist thickets and grass-grown places, nearly past flowering, and with ripe capsules about the middle of August.

Distribution: Europe, southwards to southern France and northern Italy, Siberia, Mongolia, rare in eastern Asia (Manchooria, in 1902 by Litwinow), North America.

Pedicularis euphrasioides Steph. in Willd. Spec. Pl. III (1800) p. 204; Turczan. Cat. Baical. no. 853; Ledeb. Fl. Ross. III, p. 284; Turczan. Fl. Baical.-Dahur. (1851) p. 335, no. 868; Herder, Pl. Radd. (1883) p. 82, no. 516; Крыл. Фл. Алт. IV (1907) p. 975.

Found in several places in the wooded tracts of the Sayansk district, especially in thickets of foliage trees, between Kalna and Ust Algiac, in the Altaian, at Ust Kamsara, and on dry flood-plains at Ust Tara-kem. In full flower in the second half of July, with partly ripe capsules in the middle of August.

Distribution: Northern Siberia, from the Ural to Behring's Ocean, northwards to past 69° north lat., the Altai and Sayansk regions, and eastwards to the Amoor Province, Manchooria, northern Mongolia, Sakhalin, America, Greenland.

Pedicularis comosa L. Spec. Pl. ed. II (1763) p. 847; Ledeb. Fl. Alt. II, p. 432; Bunge, Enum. Alt. p. 48; Turczan. Cat. Baical. no. 856 (excl. var.); Ledeb. Fl. Ross. III, p. 292; Turczan. Fl. Baical.-Dahur. (1851) p. 341, no. 875; Herder, Pl. Radd. (1883) p. 95, no. 526; Крыл. Фл. Алт. IV (1907) p. 980.

In meadows on an islet in the Yenisei, near Minusinsk, in flower at the end of June, and at Ust Algiac.

Distribution: Southern Europe, Caucasia and south-western Asia, Siberia, northern Mongolia. In eastern Asia it is replaced by the very nearly allied *P. venusta* Schang.

Pedicularis sudetica Willd. Spec. Pl. III (1800) p. 209; Turczan. Cat. Baical. no. 854; Ledeb. Fl. Ross. III, p. 286; Turczan. Fl. Baical.-Dahur. (1851) p. 336, no. 869; Herder, Pl. Radd. (1883) p. 89, no. 521.

In the Altaian, in humid places, below the snow-line, where I have found the species to be rather frequent; in full flower at the end of July.

Distribution: Central Europe (Riesengebirge), arctic parts of eastern Europe and Siberia, Novaya Zemlya, the Sayansk and Trans Baikal mountains, North America.

Pedicularis versicolor Wahlenb. Fl. Helvet. (1813) p. 118; Ledeb. Fl. Alt. II, p. 437; Bunge, Enum. Alt. p. 50; Turczan. Cat. Baical. no. 858; Ledeb. Fl. Ross. III, p. 300; Turczan. Fl. Baical.-Dahur. (1851) p. 347, no. 882; Herder, Pl. Radd. (1883) p. 108, no. 537; Крыл. Фл. Алт. IV (1907) p. 985.

In the Altaian, above the limit of tree vegetation, at an altitude of about 1800 m. above sea-level, in moist, grassy and mossy places. In full flower at the end of July.

Distribution: Arctic and alpine tracts of Europe, Novaya Zemlya, arctic Siberia, northwards to 74½° north lat., and eastwards to Behring's Ocean, northern Mongolia, the Altai and Sayansk districts to Trans Baikal, the Thian-Shan, Pamir, Tibet, the Himalayas, China, North America.

Orobanchaceae LINDL.

Phelipaea lanuginosa C. A. Meyer, Ind. Cauc. (1831) p. 104; Ledeb. Fl. Alt. II, p. 460; Ledeb. Fl. Ross. III, p. 310; Turczan. Fl. Baical.-Dahur. (1851) p. 354, no. 887; Крыл. Фл. Алт. IV (1907) p. 990. *Orobanche caesia* Reichenb., Beck v. Mannaget. Monogr. Gatt. *Orobanche* (Bibl. Bot. 19, 1890) p. 120.

Scattered among rocky débris of Devonian sandstone, on dry hill-slopes on the Abakan Steppe, near Askys, where parasitical on the roots of *Thymus Serpyllum*. The species begins flowering here about the middle of June.

Distribution: Middle and south-eastern Europe, Caucasia and south-western Asia to Tibet and the Himalayas, southern Siberia, eastwards to Trans Baikal.

Selaginaceae LINDL.

Lagotis glauca Gaertn. var. **Pallasii** Chamis. et Schlechtend. in Linnaea II, p. 560; Herder, Pl. Radd. (1884) p. 238, no. 544; Крыл. Фл. Алт. IV (1907) p. 999. *Gymnandra Pallasii* Chamis. et Schlechtend. l. c. p. 564 (incl. *G. Stelleri* et *G. Gmelini*); Ledeb. Fl. Ross. III, p. 332. *G. altaica* (Willd.) Ledeb. Fl. Alt. II, p. 420; Turczan. Cat. Baical. no. 832; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 643. *G. borealis* Pall. Itin. III, p. 710; Turczan. Fl. Baical.-Dahur. (1851) p. 360, no. 891. *G. integrifolia* in Turczan. Cat. Baical. no. 831.

Scattered in the Altaian, above the limit of tree vegetation, at an altitude of about

1800 m. above sea-level, in moist, moss-grown places, along brooks' courses, etc. In full flower at the end of July.

Distribution: Eastern Russia, arctic Siberia, northwards to Taimur, and eastwards to Behring's Ocean, northern Mongolia, the Thian-Shan, the Altai and Sayansk districts to Trans Baikal, China, Pamir, the Himalayas, arctic America.

Lentibulariaceae LINDL.

Pinguicula vulgaris L. Spec. Pl. ed. II (1762) p. 25; Ledeb. Fl. Ross. III, p. 2; Herder, Pl. Radd. (1872) p. 378, no. 68.

Scattered in humid places in the subalpine regions of the Amyl valley, and also about Ust Sisti-kem. In full flower in July.

Distribution: Nearly all over Europe and south-western Asia, Siberia, northern Mongolia, North America, Greenland.

Utricularia vulgaris L. Spec. Pl. ed. II (1762) p. 26; Ledeb. Fl. Alt. I, p. 17; Turczan. Cat. Baical. no. 913; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 722; Ledeb. Fl. Ross. III, p. 1; Turczan. Fl. Baical.-Dahur. (1849) p. 286, no. 757; Herder, Pl. Radd. (1872) p. 375, no. 66; Крыл. Фл. Алт. III (1904) p. 803.

Pretty common in the swamps near Ust Kamuishto, where I have collected it in full flower in the second half of June. Also of very frequent occurrence in ponds on islets in the river Abakan, near Askys.

Distribution: Europe, except the extreme south, Caucasia, south-western Asia to Turkestan and Pamir, Siberia, northwards to 62° north lat., and eastwards to the Amoor Province, Manchooria, Corea, northern Mongolia, Japan, North America, Mexico, Cuba, North Africa.

Fig. 110. *Lagotis glauca* GAERTN. var. *Pallasii* CHAMIS. et SCHLECHTEND. (1/1).

Utricularia minor L. Spec. Pl. ed. II (1762) p. 26; Ledeb. Fl. Alt. I, p. 18; Ledeb. Fl. Ross. III, p. 2; Крыл. Фл. Алт. III (1904) p. 804.

Scattered in peaty swamps near Ust Algiac, together with *Ranunculus radicans* subspec. *multifidus*, in flower at the end of July, and in pools at Ust Tara-kem.

Distribution: Europe, southwards to middle Italy and Austro-Hungary, Siberia, northwards roughly to 66½° north lat., and eastwards to the Amoor Province and Manchooria, northern Mongolia, the Himalayas, North America, Greenland.

Plantaginaceae Lindl.

Plantago major L. Spec. Pl. ed. II (1762) p. 163; Ledeb. Fl. Alt. I, p. 143; Turczan. Cat. Baical. no. 936; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 730; Ledeb. Fl. Ross. III, p. 476; Turczan. Fl. Baical.-Dahur. (1852) p. 401, no. 831; Herder, Pl. Radd. (1887) p. 56, no. 608; Крыл. Фл. Алт. IV (1907) p. 1083. *P. asiatica* Ledeb. Fl. Alt. I, p. 143 (non L.).

This species is very common in the territory traversed, especially in slightly moist soil, where occurring in a series of different forms, between which there are to be found intermediate types. Besides the typical plant, the following main forms seemed to be separable in the material collected: *f. asiatica* Decne. et *f. minima* Decne. Collected flowering in June on the Abakan Steppe, near habitations, on islets in the rivers Abakan and Yenisei, about Minusinsk, in several places along the road to Kushabar, on the banks of the river Amyl, and in court-yards in the Amyl taiga. Also found in the Urjankai country, at Ust Algiac, and at Ust Sisti-kem.

Distribution: Nearly all over Europe and Asia, in Siberia northwards to about 66° north lat., introduced into North America and the southern hemisphere.

Plantago Cornuti Gouan, Illustr. et Observat. Botan. (1773) p. 6; Turczan. Fl. Baical.-Dahur. (1852) p. 403, no. 933; Крыл. Фл. Алт. IV (1907) p. 1085. *P. asiatica* L., Ledeb. Fl. Ross. III, p. 479. *P. exaltata* Horn., Ledeb. Fl. Alt. I, p. 144; Turczan. Cat. Baical. no. 938; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 731. *P. major* L. *β asiatica* Decne., Herder, Pl. Radd. (1887) p. 59, no. 609.

In moist grass-field on the borders of the salt-lake Tagarski osero, together with *Aster Tripolium*, *Plantago maritima* subspec. *ciliata*, *Saussurea crassifolia*, *Lepidium crassifolium*, *Triglochin maritima*, and other halophilous plants, and scattered on the steppes about the Ulu-kem. Collected flowering at the beginning of July.

As compared with Reichenbach's illustration of this species in Icon. Fl. Germ. XVII, f. 1708, III, the specimens collected are distinguished by having the blades of the leaves comparatively narrower and longer. The leaves are oblong, narrowed into the petioles, not abruptly rounded or subcordate at the base, subacute at the apex, 9—12 cm. long, and 3,5—5 cm. broad.

Distribution: Southern Europe, from southern France through northern Italy, Dalmatia, Bulgaria, southern Russia, western Asia to Russian Turkestan, southern Siberia, eastwards to Trans Baikal, northern Mongolia.

Plantago maxima Aiton, Hort. Kew. I, p. 151; Ledeb. Fl. Alt. I, p. 145; Ledeb. Fl. Ross. III, p. 480; Herder, Pl. Radd. (1887) p. 62, no. 611; Крыл. Фл. Алт. IV (1907) p. 1085.

In open places on islets in the river Yenisei, near Ust Abakansk. With leaves and young flowers at the beginning of July.

Distribution: Middle and eastern Europe, western Asia to Russian Turkestan, Siberia to towards Lake Baikal.

Plantago media L. Spec. Pl. ed. II (1762) p. 136; Ledeb. Fl. Alt. I, p. 146; Turczan. Cat. Baical. no. 939; Ledeb. Fl. Ross. III, p. 480; Turczan. Fl. Baical.-Dahur. (1852) p. 404, no. 934; Herder, Pl. Radd. (1887) p. 63, no. 612; Крыл. Фл. Алт. IV (1907) p. 1086.

On the Abakan Steppe, near Ust Kamuishto, on dry hills, on the road between Minusinsk and Kushabar, and scattered in the Amyl taiga; flowering in the first half of July, moreover, found to be rather frequent in the Urjankai country, as for instance about Ust Algiac, at Ust Sisti-kem, and at Ust Kamsara.

var. **Urvilleana** Rap., Decne. in DC. Prodrom. XIII. p. 697; Крыл. Фл. Алт. IV (1907) p. 1086.

Pretty common in sandy places on the islets in the rivers Yenisei and Abakan, where it begins flowering in the first half of June.

Distribution: Nearly all over Europe, except the most northern and western regions, south-western Asia and Persia to Russian Turkestan, Siberia, northwards to about 66° north lat., and eastwards to the Amoor Province and Manchooria, China, northern Mongolia, Sakhalin, North Africa. Var. *Urvilleana* especially in the steppe region.

Plantago maritima L. Spec. Pl. ed. II (1762) p. 165; Ledeb. Fl. Alt. I, p. 148; Turczan. Cat. Baical. no. 940; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 732; Ledeb. Fl. Ross. III, p. 485; Turczan. Fl. Baical.-Dahur. (1852) p. 404, no. 935; Herder, Pl. Radd. (1887) p. 65, no. 615; Крыл. Фл. Алт. IV (1907) p. 1088.

subspec. **ciliata** nov. subspec.

Ab forma typica differt laciniis corollae dense et distincte ciliatis, vulgo brevioribus latioribusque, late ovatis, non ut in forma typica ovato-lanceolatis.

This characteristic subspecies is of rather common occurrence along the salt marshes and in saline soil on the Abakan Steppe, at Ust Kamuishto, on the borders of the salt-lake Tagarski osero, south of Minusinsk, and on the Ulu-kem Steppe. It begins flowering about the middle of June.

All the specimens from the localities mentioned are distinguished by having the lobes of the corolla rather densely and distinctly ciliate, as also considerably shorter and broader than in the typical plant. By their short, broad corolla-lobes the flowers are more suggestive of those to be found in the nearly allied species *P. carinata*. The corolla-tube is brownish and rather densely pubescent. The flower proper is 3—3,5 mm. long. The bracts generally reach up to about the summit of the sepals, only the lower ones in each spike being frequently somewhat larger, and somewhat over-

top the calyx. The bracts are slightly navicularly clapped together along the midrib, and furnished along the outer side of the latter with a rather prominent keel, which is rather coarsely and deeply dentate or hispid. The sepals themselves are about 2 mm. long, oblong, obtuse or subacute, with a broad, green midrib, and narrow, scarious margins, densely and distinctly hirsute. The leaves are linear, entire, glabrate, or only sparingly pubescent, 1- or 3-nerved, or sometimes also without distinct nerves. In point of external habitus, the subspecies *ciliata*, for the rest, completely resembles the typical form. As this subspecies has been found by me in localities far apart — in Siberia and in the Urjankai country — there is reason to believe that it is more widely distri-

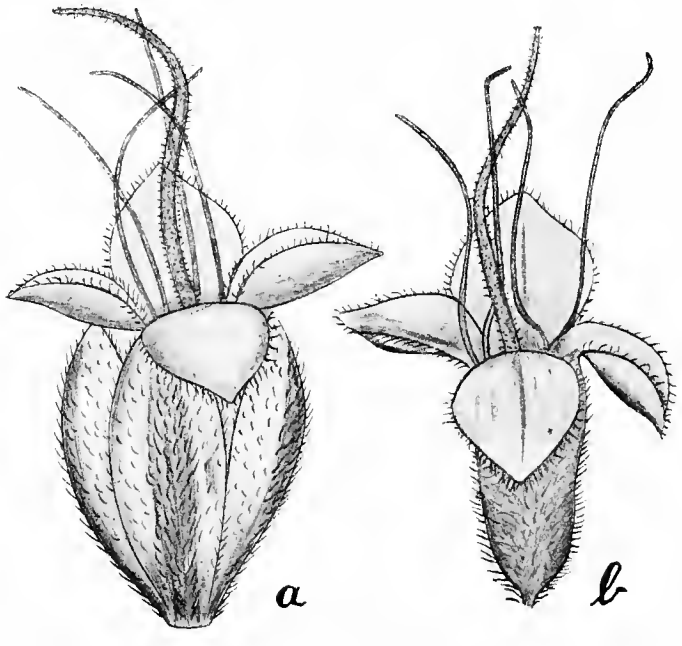

Fig. 111. *Plantago maritima* L. subspec. *ciliata* nov. subspec.
a. Perfect flower. — b. Flower, the calyx removed ($^{12}/_{1}$).

buted in these districts. As the typical form is not to be found at all in my material brought home, there is some probability that the latter is really replaced, in the main or altogether, by this subspecies.

Distribution: The main species occurs along the shores and in saline soil throughout Europe, south-western Asia, Siberia, northern Mongolia, Manchooria, Sakhalin, North Africa, North America, Greenland.

Rubiaceae Juss.

Asperula odorata L. Spec. Pl. ed. II (1762) p. 150; Ledeb. Fl. Alt. I, p. 139; Ledeb. Fl. Ross. II, p. 400; Herder, Addend. et Emend. ad Pl. Radd. (1881) p. 145; Крыл. Фл. Алт. III (1904) p. 556.

In the Amyl taiga, scattered on dry hills in thickets of foliage and coniferous trees; past flowering about the middle of July.

Distribution: Europe, except the most northern parts, Caucasia and south-western Asia, Siberia, eastwards to about the government of Yeniseisk, Sakhalin, Japan, North Africa, North America (fugitive from Europe).

Galium Aparine L. Spec. Pl. ed. II (1762) p. 157; Ledeb. Fl. Alt. I, p. 134; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 407; Ledeb. Fl. Ross. II, p. 419; Turczan. Fl. Baical.-Dahur. (1845) p. 313, no. 555; Herder, Pl. Radd. (1864) p. 212, no. 16; ibid. 1881. p. 148; Крыл. Фл. Алт. III (1904) p. 563.

Of rather common occurrence on islets in the Lower Abakan, in waste places and near the fields of the Abakan Tatars. The specimens exhibit rather considerable variations as to the shape, length, and breadth of the leaves, the length of the internodes, the whole plant being also much varying in roughness. These characters are, in some measure, due to variations in the conditions of life, but the specimens surely also belong to several different systematical forms. In this case, the forms in question cannot be settled definitely, as all the specimens, collected in the month of June, are very young, wanting flowers and fruits, without which a reliable determination is impracticable.

Distribution: Nearly all over Europe and Asia, North Africa, southwards to Kamerun, introduced into North and South America and Australia.

Galium vernum Scop. Fl. Carniol. I (1772) p. 99; Ledeb. Fl. Alt. I, p. 132; Ledeb. Fl. Ross. II, p. 417; Крыл. Фл. Алт. IV (1904) p. 562.

In mixed woods and thickets at Ust Sisti-kem, past flowering about the middle of August.

Distribution: Middle Europe, Caucasia, Siberia, eastwards to about the government of Yeniseisk, northern Mongolia.

Galium uliginosum L. Spec. Pl. ed. II (1762) p. 153; Ledeb. Fl. Alt. I, p. 135; Turczan. Cat. Baical. no. 564; Ledeb. Fl. Ross. II, p. 408; Turczan. Fl. Baical.-Dahur. (1845) p. 312, no. 552; Herder, Pl. Radd. (1864) p. 215, no. 17; ibid. 1881, p. 152; Крыл. Фл. Алт. III (1904) p. 559.

Not unfrequent in marshes and wet places on the islets in the river Abakan, about Kushabar, in several places in the Amyl taiga, and at Ust Algiac, where occurring together with *Galium palustre,* moreover, at Ust Sisti-kem and Ust Kamsara. Specimens from the various localities differ rather considerably in the length and solidity of the stems, in the shape and size as well as in the length of the cups of the leaves. Collected flowering and with fruits in July and August.

Distribution: Over the greater part of Europe, Turkestan, Siberia, in the Yenisei valley northwards to 70° 20′ north lat., and eastwards roughly to the river Lena, northern Mongolia.

Galium palustre L. Spec. Pl. ed. II (1762) p. 153; Ledeb. Fl. Alt. I, p. 135; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 410; Herder, Pl. Radd. (1864) p. 215, no. 18; ibid. 1881, p. 154; Крыл. Фл. Алт. III (1904) p. 559.

This species seemed — at any rate to judge from my observations — to be rather rare in the territory traversed, where I have met with it only in a single locality, viz. near Ust Algiac, in damp and shady places, associated with the preceding one.

Distribution: Europe, except the most southern parts, Caucasia and south-western Asia, Siberia, in the Yenisei valley northwards to about 70° 20′ north lat. (the occurrence reported in eastern Siberia is dubious), North Africa, North America, Greenland.

Galium trifidum L. Spec. Pl. ed. II (1762) p. 153; Ledeb. Fl. Alt. I, p. 133; Turczan. Cat. Baical. no. 565; Ledeb. Fl. Ross. II, p. 409; Turczan. Fl. Baical.-Dahur. (1845) p. 312, no. 553; Herder, Pl. Radd. (1864) p. 216, no. 20; ibid. 1881, p. 158; Крыл. Фл. Алт. III (1904) p. 560.

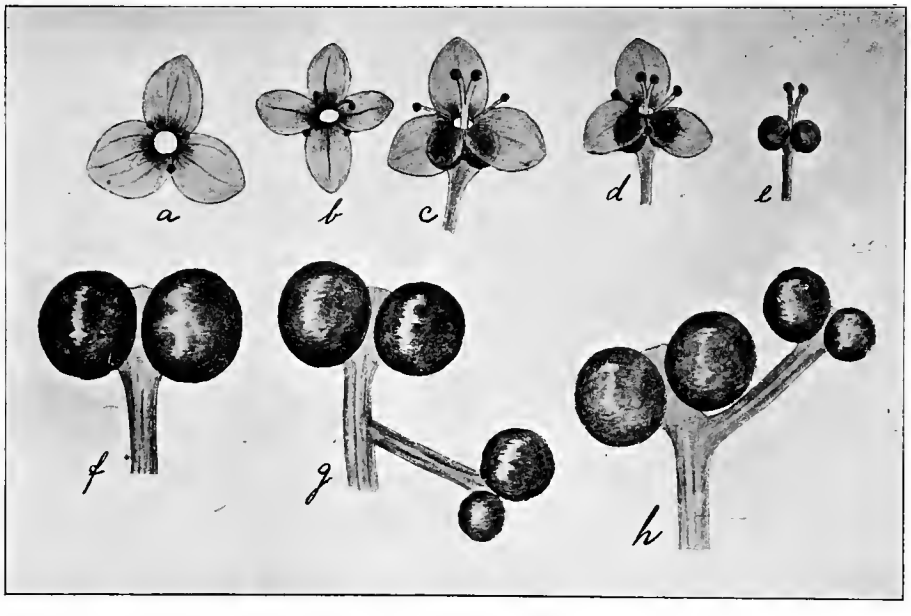

Fig. 112. *Galium trifidum* L. subspec. *distentum* nov. subspec. a-b. Petals and stamens, seen from above. — c-d. Perfect flowers. — e. Ovary. — f-h. Fruits ($^{12}/_{1}$).

subspec. **distentum** nov. subspec.

Ab forma typica differt pedunculis omnino glabris, nunquam retrorsus hispidulis, ad 12 mm. longis, capillaribus, plus minus recurvatis, vulgo unifloris. Corolla 3- vel interdum 4- partita, laciniis ovatis. Fructibus levibus, globosis, distantibus, nunquam connatis. Caules tenui, altius sulcati, angulati. Folia glabra.

Specimens of this one somewhat resemble *Galium palustre* L. as to stature: in their comparatively coarse, erect stems, attaining a length of 25—30 cm., with rather long

Fig. 113. *Galium trifidum* L. subspec. *distentum* nov. subspec. (1/1).

internodes, shorter branches, and in the correspondingly coarser leaves, up to 16 mm. long, and 2,5 mm. broad. It is distinguished, however, by the very same features characteristic of *Galium trifidum*, especially by having the flowers solitary, on long, capillary pedicels, axillary, 2—3 at each node, or terminal. Sometimes the pedicels are seen to be branched, bearing a more or less reduced second flower, the fruits of which never develop into the size of the terminal flower (fig. 112). The pedicels are rather long and very fine, to 12 mm., much longer than the leaves, more or less distinctly arching. The corolla is very small, 3- or rarely 4-parted, its lobes white, broadly ovate. The number of the stamens coresponds to that of the corolla-lobes. The fruits are glabrous, generally mutually quite free, or only very slightly united. In the typical *G. trifidum* the pedicels are distinctly, frequently even very sharply retrorse-scabrous. These prickles are never to be found in subspec. *distentum*, whose pedicels are always glabrate. This character also recalls *G. palustre* L.; the latter differs, however, distinctly from our plant in its shorter, coarser, rather strict and spreading pedicels, in its more connate, to nearly altogether united fruits, moreover, in having the flowers, from 3—6, in denser, lateral, or terminal cymes. The stem in subspec. *distentum* is, for the rest, slightly rough. The leaves are nearly completely glabrous, or only sparingly scabrous along the margin and the midrib on the under side, always in whorls of 4.

From Sweden a form is reported under the name of *Galium palustre* × *trifidum* in NEUMAN, Sveriges Flora (1901) p. 108, declared to agree with *G. trifidum* in point of habitus, but with glabrous pedicels and cymose flowers. This character does not agree with my specimens, in which the flowers are arranged as is typical in *G. trifidum*. I have therefore thought it convenient to separate my specimens as a distinct subspecies. The well-grown fruits did not appear to favour the bellief that they were hybrids either. Typical specimens of *G. trifidum* L. are not to be found in my collections.

Specimens of the above subspecies have been collected by me in peat-bogs at Ust Algiac, and on the Upper Sisti-kem, associated with *Carex microglochin*, with flowers and young fruits in the second half of July, and near Ust Tara-kem, in swampy places,

Distribution: The typical *Galium trifidum* is distributed over northern and eastern Europe (very rare in Germany), Siberia, northwards to about 68° north lat., northern Mongolia, Manchooria, Corea, Sakhalin, Japan, North America.

Galium boreale L. Spec. Pl. ed. II (1762) p. 156; Ledeb. Fl. Alt. I, p. 136; Bunge, Enum. Alt. p. 8; Turczan. Cat. Baical. no. 566; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 411; Ledeb. Fl. Ross. II, p. 412; Turczan. Fl. Baical.-Dahur. (1845) p. 314, no. 556; Herder, Pl. Radd. (1864) p. 217, no. 22; ibid. 1881, p. 161; Крыл. Фл. Алт. III (1904) p. 560.

It appears from the material collected that this species varies considerably in the territory explored, especially so in the breadth of the leaves and in the pubescence of the plants on the whole. Specimens are to be found, in which the leaves and stems as well as the fruits are nearly completely glabrous, or only very sparingly pubescent. Most of these specimens are distinctly intermediate between *f. hyscopifolium* DC. (*f. hyssopifolium* Koch

f. glabrum GREN. et GODR.) and *f. intermedium* DC. et KOCH (*f. scabrum* GREN. et GODR.)

On the other hand, some specimens may be very hairy, the leaves now and then with a nearly canescent pubescence, or nearly felted in spots, while other parts in the same plant are nearly or completely glabrous. The fruits in these specimens are completely hoary, so as to give the whole fruit-bearing a silver-white appearance. These specimens are referred by me to *f. genuinum* GREN. et GODR. (*f. scabrum* DC.) and *f. vulgare* TURCZAN. Intermediates between glabrate specimens and hairy ones are rather frequent. There are also considerable variations in the length of the internodes, and in the shape and size of the leaves.

In natural meadows on islets in the Yenisei, near Ust Abakansk, I have collected, at the beginning of June, young, as yet flowerless specimens of a very luxuriant and characteristic form, with stems 60—80 cm. high, and 4—5 mm. in diameter, with leaves 5—6 cm. long, and to 12 or 13 mm. broad. Thus, in the shape of the leaves, there are to be found a great number of types, from the common, narrowly lanceolate one with a broad base, tapering upwards and generally slightly extended at the apex, through all transitions, to specimens with narrowly elliptic leaves, subobtuse at the top. The typical var. *latifolium* TURCZAN., especially characterized by broad, 5-nerved leaves, has not been observed by me in the territory explored. Besides forms with the commonly rather vigorous and erect stems, there occur specimens with somewhat relaxed and ascending stems, and with more spreading or drooping pedicels.

The flowering in this species did not appear to begin till the end of June. The specimens I have collected in the course of June, are therefore destitute of flowers and fruits, owing to which this material cannot be precisely determined.

Very common in the territory explored, in southern Siberia as well as in the Urjankai country, where I have collected it at Ust Algiac, Ust Sisti-kem, near the Kamsara, at Ust Tara-kem, near Bjelosarsk, and on the Tapsa.

Distribution: Northern and middle Europe, Caucasia, Turkestan, the Himalayas, Siberia, in the Yenisei valley northwards to 70° 20′ north lat., and eastwards to the Tshuktsher Peninsula and Kamtchatka, northern Mongolia, Manchooria, China, Sakhalin, Japan, North America.

Galium densiflorum Ledeb. Fl. Alt. I, p 137; Ledeb. Fl. Ross. II, p. 413; Крыл. Фл. Алт. III (1904) p. 561.

f. **leiocarpum** nov. f.

Ab forma typica differt germinibus semper omnino levibus vel subgranulosis, nunquam villosis. Nodis leviter pilosis, caule ceterum glabro. Pedunculis quadrangulatis, glabris vel sparse hispidulis. Fructibus maturis fere 1 mm. diametro omnino glabris, interdum leviter granulosis, nunquam pilosis.

The specimens occurring in my collections, differ in some respects from the description given by the author in Flora Altaica and Flora Rossica. They especially differ in

having the ovaries glabrous, never hairy („Germina villosa" LEDEB. Fl. Alt.). KRYLOW also reports l. c.: „Завязь волосистая". It appears from the following statement of LEDEBOUR's that the ripe fruits have been unknown to him: „Fructus maturi desunt" (Fl. Alt.) and „germinibus villosis, fructibus...." (Fl. Ross.). Nor does KRYLOW seem to know the ripe fruits, as he does not mention them in his description of the species. In my specimens the ripe fruits are about 1 mm. in diameter, glabrous, or, examined by means of a powerful lens, very finely and slightly warty on the surface, but never hairy. Whether the fruits be warty in the way described when fresh, or the warts be produced by the drying, I must leave unsettled. LEDEBOUR's statement of the leaves being „horizontalia" does not agree with my specimens either, in which they are more or less appressed, only with the exception of the lower ones. The stems are quadrangular, glabrous, except below the nodes, where they are finely, but distinctly puberulent. For the rest, the specimens agree with the earlier description. The pedicels, of about the same length as the bracts, are angular and sulcate, frequently nearly winged, glabrous, or they may frequently be thinly sprinkled with short, stiff bristles. In distinction of the form described here, I propose the one described by LEDEBOUR to be entered as *f. genuina*.

Occurring on the steppes on the Yenisei, between Minusinsk and Ust Abakansk, where collected by me with flowers and a few ripe fruits, June 30th.

Distribution: Near Smejov (Ledebour, Fl. Alt.), and near Minusinsk.

Galium verum L. Spec. Pl. ed. II (1762) p. 155; Ledeb. Fl. Alt. I, p. 138; Turczan. Cat. Baical. no. 567; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 412; Ledeb. Fl. Ross. II, p. 414; Turczan. Fl. Baical.-Dahur. (1845) p. 315, no. 557; Herder, Pl. Radd. (1864) p. 221, no. 24; Крыл. Фл. Алт. III (1904) p. 561.

The most common form of this one is *f. leiocarpum* DC., with glabrous fruits. The stems, especially in the lower parts, are always covered with dense and fine, short, downy hairs, while the leaves, as a rule, are glabrous, at any rate on the upper side. This form appeared to be the most common one in the territory explored.

Besides, I have collected near Kushabar, on dry hills, some specimens of *f. trachycarpum* DC. (*f. lasiocarpum* LEDEB., *G. ruthenicum* WILLD., LEDEB. Fl. Alt. I, p. 138), with hairy fruits. Besides, the stem and the under side of the leaves in this form being always covered with very short and dense, downy hairs, the upper side of the leaves, as well, is frequently found to be beset with more or less scattered hairs. Intermediates between the said forms did not appear to be rare either.

Rather common in the territory explored, especially in dry meadows and on dry hills, on sunny declivities, etc., on the islets in the river Abakan, and on the Abakan Steppe, in several places between Minusinsk and Kushabar, at Ust Sisti-kem, near Ust Kamsara, at Ust Tara-kem, and on the Tapsa. On the Abakan Steppe the species does not begin flowering till the end of June.

Distribution: Europe, except the extreme northern regions, Caucasia, south-western

Asia to the Himalayas and Cashmere, Siberia, in the Yenisei valley northwards to 72° 40′ north lat., northern Mongolia, Manchooria, northern China, Corea, Sakhalin, Japan, North Africa, North America (introduced from Europe).

Galium Mollugo L. Spec. Pl. ed. II (1762) p. 155; Ledeb. Fl. Ross. II, p. 407.

This plant has not been observed heretofore in Siberia at all, and is not to be found inserted in any of the floras relating to these regions within my reach. KORSHINSKY, Tentamen Florae Rossiae Orientalis, St. Petersbourg 1898, p. 193, also declares: „Planta europaea, in Sibiria plane deesse videtur." I have collected some young specimens, no doubt belonging to this species, in dry meadows on an islet in the Yenisei, near Ust Abakansk.

Distribution: Europe, except the extreme north, Caucasia and south-western Asia, southern Siberia (hitherto only in the Minusinsk district), North America (adventive from Europe).

Caprifoliaceae VENT.

Adoxa Moschatellina L. Spec. Pl. ed. II (1762) p. 527; Ledeb. Fl. Alt. II, p. 87; Turczan. Cat. Baical. no. 555; Ledeb. Fl. Ross. II, p. 382; Turczan. Fl. Baical.-Dahur. (1845) p. 297, no. 543; Herder, Pl. Radd. (1864) p. 193, no. 1; ibid. 1878, p. 3; Крыл. Фл. Алт. III (1904) p. 548.

In shady thicket, near Kushabar. Nearly past flowering in the middle of July.

Distribution: Europe, Caucasia, all over Siberia, northwards to 71° north lat., Turkestan, the Thian-Shan, Cashmere, northern Mongolia, Sakhalin, North America.

Sambucus racemosa L. Spec. Pl. ed. II (1762) p. 386; Ledeb. Fl. Alt. I, p. 420; Turczan. Cat. Baical. no. 557; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 402; Ledeb. Fl. Ross. II, p. 383; Turczan. Fl. Baical.-Dahur. (1845) p. 300, no. 545; Herder, Pl. Radd. (1864) p. 193, no. 2; ibid. 1878, p. 5; Крыл. Фл. Алт. III (1904) p. 548.

In thickets on the river Amyl, between Kushabar and Petropawlowsk, rather frequent in the Amyl taiga and on the Kamsara. With young fruits about the middle of July.

Distribution: Middle Europe, Siberia, northwards to 65° 50′ north lat. (in the Yenisei valley), and eastwards to Kamtchatka, northern Mongolia, northern China, Corea, Sakhalin, Japan, North America.

Lonicera coerulea L. Spec. Pl. ed. II (1762) p. 249; Ledeb. Fl. Alt. I, p. 247 (incl. *L. Pallasii* Ledeb.); Turczan. Cat. Baical. no. 561; Ledeb. Fl. Ross. II, p. 390; Turczan. Fl. Baical.-Dahur. (1845) p. 305, no. 549; Herder, Pl. Radd. (1864) p. 204, no. 12; ibid. 1878, p. 20; Крыл. Фл. Алт. III (1904) p. 553; Rehder, Synops. of the Genus *Lonicera* (Missouri Botanical Garden XIV, 1905) p. 72.

The specimens collected have the leaves comparatively narrow and subacute, completely glabrous, only along the margin furnished with a number of rather long, vigorous,

somewhat appressed hairs. The under sides of the leaves are, however, frequently sparingly pubescent along the midveins. The stem is of a deep reddish brown, and like the pedicels, measuring 6—7 mm. in length, completely glabrous.

Collected with young fruits about the middle of July, in several places on the Upper Amyl, near Ust Algiac, and near Ust Sisti-kem in the middle of August. My material agrees rather perfectly with *var. glabrescens* RUPR. var. *α* in TURCZAN. l. c. p. 305, HERDER, l. c.

Distribution: Northern and middle Europe, Caucasia, Turkestan, Siberia, in the Yenisei valley northwards to 69° north lat., and eastwards to Kamtchatka, northern Mongolia, China, northern Corea, Sakhalin, North America.

Viburnum Opulus L. Spec. Pl. ed. II (1762) p. 384; Ledeb. Fl. Alt. I, p. 420; Turczan. Cat. Baical. no. 558; Ledeb. Fl. Ross. II, p. 384; Turczan. Fl. Baical.-Dahur. (1845) p. 301, no. 546; Herder, Pl. Radd. (1864) p. 195, no. 3; ibid. 1878, p. 8; Крыл. Фл. Алт. III (1904) p. 1904.

Scattered in open woods of conifers and foliage trees about the river Amyl. Specimens found flowering and past flowering about the middle of July.

Distribution: Europe, Caucasia, Turkestan, Siberia, northern Mongolia, Manchooria, northern China, Corea, Sakhalin, Japan, North America.

Linnaea borealis L. Spec. Pl. ed. II (1763) p. 880; Ledeb. Fl. Alt. II, p. 464; Turczan. Cat. Baical. no. 562; Ledeb. Fl. Ross. II, p. 392; Turczan. Fl. Baical.-Dahur. (1845) p. 307, no. 550; Herder, Pl. Radd. (1864) p. 209, no. 14; ibid. 1878, p. 26; Крыл. Фл. Алт. III (1904) p. 555; Wittrock, *Linnaea borealis* in Act. Hort. Berg. B. 4 (1907) no. 7.

This species is rather common in the coniferous forests of southern Siberia and the Urjankai country, where found be me in the valleys of the rivers Amyl, Sisti-kem, and Bei-kem. In his monography, WITTROCK bases the classification of the numerous forms of this species upon the colours of the corolla, but as a trustworthy inquiry into the original colours cannot be founded on dried material, I have not dared to identify my specimens with any of those mentioned there. Taken with flowers and fruits in July and August.

Distribution: Northern and middle Europe, Caucasia, the subalpine regions of Siberia, eastwards to Kamtchatka, northern Mongolia, Manchooria, northern China, Corea, Sakhalin, Japan, North America.

Valerianaceae DUMORT.

Valeriana capitata Pallas in Willd. Herb. no. 789; Ledeb. Fl. Alt. IV, p. 331; Turczan. Cat. Baical. no. 573; Ledeb. Fl. Ross. II, p. 435; Turczan. Fl. Baical.-Dahur. (1845) p. 320, no. 561; Herder, Pl. Radd. (1864) p. 227, no. 28; ibid. 1881, p. 177; Крыл. Фл. Алт. III (1904) p. 567. *V. alpestris* Ledeb. Fl. Alt. I, p. 51.

Pretty common in the Altaian, at an altitude of about 2000 m. above sea-level, especially in places grown with mosses and lichens, on moist, shady declivities facing north, where I have collected it accompanying *Cardamine bellidifolia, Papaver nudicaule* subspec. *xanthopetalum, Ranunculus altaicus,* etc. In full flower at the end of July.

Distribution: Arctic Russia, Novaya Zemlya, arctic and alpine portions of Siberia to Behring's Ocean to the east, Turkestan, the Altai and Sayansk regions, northern Mongolia.

Valeriana officinalis L. Spec. Pl. ed. II (1762) p. 45; Turczan. Cat. Baical. no. 575; Ledeb. Fl. Ross. II, p. 438; Turczan. Fl. Baical.-Dahur. (1845) p. 321, no. 563 (incl. *V. heterophylla* Turczan. l. c. p. 321, no. 562); Herder, Pl. Radd. (1864) p. 228, no. 29; ibid. 1881, p. 178; Крыл. Фл. Алт. III (1904) p. 570.

This species is pretty common in the territory explored, where occurring in a series of different varieties, between which there are to be found intermediates. Besides the typical plant, I have collected specimens of var. *dubia* Bunge (spec.), var. *heterophylla* Turczan. (l. c. spec.), and var. *angustifolia* Rupr.

On the islets in the river Abakan the species begins flowering in the middle of June. It was very common on the islets in the rivers Abakan and Yenisei, at Karatus and Kushabar, in the Amyl valley, at Ust Algiac, Ust Sisti-kem, and at Ust Kamsara.

Distribution: Europe. Caucasia and south-western Asia to Turkestan, the Himalayas, Cashmere, Siberia, northwards to 70° north lat. and eastwards to the Pacific Ocean, Manchooria, Corea, China, northern Mongolia, Sakhalin, Japan, North America (introduced).

Patrinia sibirica Jussieu in Ann. Mus. X, p. 311; Ledeb. Fl. Alt. I, p. 131; Turczan. Cat. Baical. no. 571; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 413; Ledeb. Fl. Ross. II, p. 426; Turczan. Fl. Baical.-Dahur. (1845) p. 317, no. 558; Herder, Pl. Radd. (1864) p. 223, no. 25; ibid. 1881, p. 173; Крыл. Фл. Алт. III (1904) p. 565.

Pretty common on the tops of the ridges on the Abakan Steppe, where especially occurring on dry, gravelly declivities, together with some few other plants, such as *Thymus Serpyllum, Arctogerron gramineus,* and the like. Collected in full flower, with half ripe fruits about the middle of June. This species varies rather much in the height of the stem, in the size, shape, and incisions of the leaves, as well as in the pubescence. On the stem there is generally to be found one pair of opposite leaves, the place of which, for the rest, is quite accidental, sometimes to be found quite at the top, very near the flower cluster or farther down, sometimes quite below, almost at the base of the stem, where, however, they are readily distinguished from the real basal leaves by having generally deeper incisions than the basal ones, which are sometimes nearly entire. At any rate, to judge from my material, there is never to be found more than one pair of stem-leaves, but they always seemed to be traceable, although, in many cases, being displaced right down to the base of the stem.

Distribution: The Ural, southern Siberia to about the government of Yakutsk, northern Mongolia.

Dipsaceae LINDL.

Scabiosa ochroleuca L. Spec. Pl. ed. II (1762) p. 146; Turczan. Cat. Baical. no. 577; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 420; Ledeb. Fl. Ross. II, p. 456; Turczan. Fl. Baical.-Dahur. (1845) p. 325, no. 565; Herder, Pl. Radd. (1864) p. 235, no. 32; ibid. 1881, p. 186; Крыл. Фл. Алт. III (1904) p. 573. *S. Columbaria* L. *β ochroleuca* Ledeb. Fl. Alt. I, p. 127.

Pretty common on the steppes about Minusinsk, where collected by me in dry, sandy places, on rocks. etc., in full flower in the early days of July. Also occurring in the Urjankai country, especially in the wooded steppe region, where I have collected it on dry declivities, near Ust Sisti-kem, at Ust Kamsara, and at Ust Tara-kem.

Distribution: Middle and south-eastern Europe, Caucasia and south-western Asia to Turkestan, Siberia, eastwards roughly to Lake Baikal, northern Mongolia.

Campanulaceae JUSS.

Campanula pilosa Pallas in Roem. et Schult. Syst. Veget. V, p. 148; Ledeb. Fl. Alt. I, p. 243; Turczan. Cat. Baical. no. 733; Ledeb. Fl. Ross. II, p. 877; Turczan. Fl. Baical.-Dahur. (1848) p. 475, no. 724; Herder, Pl. Radd. (1872) p. 288, no. 4; Trautv. Catal. *Campanul.* Ross. (Act. Hort. Petropol. VI, 1879—80) p. 59; Крыл. Фл. Алт. III (1904) p. 773.

Pretty common in the Altaian, especially on somewhat dry, sunny declivities facing south, among mosses and lichens, together with *Dryas octopetala, Gentiana algida, Gentiana altaica,* and others, at an altitude of about 2100 m. above sea-level. In full flower on the 27th of July. The specimens collected belong to *f. genuina* HERDER, l. c.

Distribution: Southern Siberia and northern Mongolia, from the eastern Altai and Sayansk regions, Baikal, and through north-western Asia to Kamtchatka and the islets in Behring's Ocean, to the west coast of America (Unalashka). In the most eastern area of the species occurs the somewhat deviating *f. dasyantha* (MARSCH.-BIEB.) HERDER.

Campanula sibirica L. Spec. Pl. ed. II (1762) p. 236; Ledeb. Fl. Alt. I, p. 244; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 571; Ledeb. Fl. Ross. II, p. 879; Herder, Pl. Radd. (1872) p. 289, no. 5; Trautv. Catal. *Campanul.* Ross. p. 61; Крыл. Фл. Алт. III (1904) p. 773.

Of very common occurrence on the Abakan Steppe, especially on grass-grown, stony declivities along the ridges, or among stones and gravel, and in open brush-wood along dried up brooks' courses. I have also observed it at Tagarski osero, and on dry, stony declivities between Karatus and Kushabar. The species begins flowering at the beginning of June. In the specimens collected the corolla is 15—26 mm. long, the stem strict, and more or less branched.

Distribution: Middle and southern Europe, northwards to southern Finland, Caucasia, southern Siberia, eastwards roughly to the Yenisei.

Campanula glomerata L. Spec. Pl. ed. II (1762) p. 235; Ledeb. Fl. Alt. I, p. 241; Turczan. Cat. Baical. no. 731; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 570; Ledeb. Fl. Ross. II, p. 880; Turczan. Fl. Baical.-Dahur. (1848) p. 477, no. 726; Herder, Pl. Radd. (1872) p. 291, no. 6; Trautv. Catalog. *Campanul.* Ross. p. 68; Крыл. Фл. Алт. III (1904) p. 774.

On dry, stony declivities near the salt-lake Tagarski osero, between Karatus and Kushabar, rather frequent on southern slopes in the Amyl taiga, scattered in the wooded steppe region of the Urjankai country, viz. at Ust Sisti-kem, Ust Kamsara, and at Ust Tara-kem. Collected flowering and past flowering in July—August. In the specimens collected the length of the corolla is about 22—26 mm., but, for the rest, the specimens vary rather considerably as to the hairiness and shape of the leaves. The upper stem-leaves are always sessile, with the base cordately incised. Some specimens have the leaves comparatively narrow, being about 6 times as long as broad.

Distribution: Europe, except the extreme north and south, Caucasia and south-western Asia to Turkestan, Siberia, northwards, in the Yenisei valley, to about 70° north lat., and eastwards to the Amoor Province and Manchooria, northern Mongolia, eastern Asia, Japan. In America only strayed.

Campanula Cervicaria L. Spec. Pl. ed. II (1762) p. 235; Ledeb. Fl. Alt. I, p. 242; Turczan. Cat. Baical. no. 732; Ledeb. Fl. Ross. II, p. 881; Turczan. Fl. Baical.-Dahur. (1848) p. 478, no. 727; Herder, Pl. Radd. (1872) p. 294, no. 7; Крыл. Фл. Алт. III (1904) p. 775.

In thickets, on dry hills, near Ust Sisti-kem, nearly past flowering about the middle of August.

Distribution: Europe, except the most northern and southern parts, Siberia, in the Yenisei valley northwards to about 66° 10′, eastwards to the government of Irkutsk, northern Mongolia.

Campanula rapunculoides L. Spec. Pl. ed. II (1762) p. 234; Ledeb. Fl. Ross. II, p. 883; Крыл. Фл. Алт. III (1904) p. 777.

Scattered in shady thickets in the Amyl taiga, especially near habitations. In full flower about the middle of July.

Distribution: Europe, except the northern and southern parts, Caucasia and south-western Asia, Siberia, eastwards to about the government of Yeniseisk.

Campanula rotundifolia L. Spec. Pl. ed. II (1762) p. 232; Ledeb. Fl. Alt. I, p. 238; Turczan. Cat. Baical. no. 729; Ledeb. Fl. Ross. II, p. 888; Herder, Pl. Radd. (1872) p. 300, no. 13; Trautv. Catalog. *Campanul.* Ross. p. 78; Крыл. Фл. Алт. III (1904) p. 779.

Of this species I have collected 2 distinct varieties:

var. **vulgaris** Kittel, Fl. Deutschl. I (1837) p. 534.

On dry hills and in thickets between Minusinsk and Kushabar, and in the Amyl valley. The variety is also rather frequent in the Urjankai country, where collected by me at Ust Algiac, Ust Sisti-kem, Ust Kamsara, and on the Tara-kem. Flowering and with fruits in July—August.

var. **linifolia** (Lam.) Wahlenb. Fl. Lapp. (1812) p. 64. *C. linifolia* Lam. Dict. I, p. 579; Ledeb. Fl. Ross. II, p. 888; Turczan. Fl. Baical.-Dahur. (1848) p. 479, no. 728.

This variety has been found by me in the Altaian, above the limit of tree vegetation, in full flower at the end of July. It is distinguished from the preceding one by having the stem lower, strict, generally simple and 1-flowered. The stems in the specimens collected are 10—15 cm. high, puberulent below, nearly glabrous above. The corolla is 17—27 mm. long. The specimens vary rather much in the breadth of the leaves, the tops of which are always obtusely rounded, appressed, not spreading, 1-nerved.

Distribution: Nearly all over Europe, Caucasia, Siberia, northwards to about 70° north lat., and eastwards to the Sea of Okhotsk, northern Mongolia, Sakhalin, North America, Greenland. The last-mentioned variety occurs especially in mountain regions.

Adenophora marsupiiflora Fischer, Adumbr. Gen. *Adenophora* in Mem. Soc. Natur. Moscou VI, p. 165—167; Ledeb. Fl. Alt. I, p. 244; Turczan. Cat. Baical. no. 735; Ledeb. Fl. Ross. II, p. 893; Turczan. Fl. Baical.-Dahur. (1848) p. 485, no. 735; Korshinsky, Untersuch. Russ. *Adenophora* in Mem. Acad. Imper. Sc. St. Petersbourg Ser. VII, T. XLII (1894) p. 29; Крыл. Фл. Алт. III (1904) p. 781. *A. polymorpha* Ledeb. var. *Gmelini* Herder, Pl. Radd. (1872) p. 307, no. 16. *A. verticillata* Fischer var. *marsupiiflora* Fischer, Trautv. Catal. *Campanul.* Ross. (1879) p. 96. *A. montana* Turczan. Fl. Baical.-Dahur. (1848) p. 484.

Near Bjelosarsk, in thickets, on dry, stony declivities.

Distribution: Southern Siberia through the Altai and Sayansk regions, Trans Baikal to the Amoor Province, northern Mongolia, Turkestan, Tibet, China, northern Corea, Manchooria.

Adenophora denticulata Fischer in Mem. Soc. Natur. Moscou VI, p. 157; Turczan. Cat. Baical. no. 737; Ledeb. Fl. Ross. II, p. 894; Turczan. Fl. Baical.-Dahur. (1848) p. 482, no. 732; Korshinsky, Untersuch. Russ. *Adenophora* (1894) p. 37. *A. communis* Fischer var. *denticulata* (Fischer) Trautv. Catalog. *Campanul.* Ross. (1879) p. 97. *A. polymorpha* Ledeb. var. *denticulata* Trautv. *α genuina* Herder, Pl. Radd. (1872) p. 308.

Of this species I have only a single specimen in my collections, taken near Ust Algiac, on the Sisti-kem, in dry, open brush-wood. The specimen measures over 1 m. in height, rather flowery; length of flowers 2—2,5 cm. In full bloom on the 19th of July. My specimen agrees perfectly with a specimen I have seen in F. Karo, Plantae Amuricae et Zeaense, curavit I. Dörfler, no. 411.

Distribution: The centre of the species seemed to be Trans Baikal, where it is especially common, ranging westwards through southern Siberia, roughly to the river Yenisei, and eastwards to the Amoor Province.

Adenophora liliifolia Ledeb. Ind. Sem. Hort. Dorpat. (1822); Ledeb. Fl. Ross. II, p. 894; Korshinsky, Unters. Russ. *Adenophora* (1894) p. 39; Крыл. Фл. Алт. III (1904) p. 781. *A. communis* Fischer in Mem. Soc. Natur. Moscou VI, p. 168; Ledeb. Fl. Alt. I, p. 246; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 572. *A. stylosa* Fischer, Ledeb. Fl. Alt. I, p. 245; Ledeb. Fl. Ross. II, p. 895. *A. polymorpha* Ledeb. var. *denticulata*, stylo exserto et *Lamarckii* stylo exserto Herder, Pl. Radd. (1872) p. 309. *A. communis* Fischer var *denticulata* (ex parte), *Lamarckii* (ex parte) et *integerrima* Trautv. Catal. *Campanul.* Ross. (1879) p. 97—99.

Specimens of the typical plant I have found in open, dry places in the Amyl taiga and at Ust Algiac, flowering in July. Besides, I have collected rather frequently small specimens, agreeing perfectly with material I have seen in the herbarium of the Imperial Botanical Gardens in Petrograd, designated by Korshinsky himself as *Adenophora liliifolia* forma *genuina* modif. *nana* Korsh. This small and very characteristic plant is very common on the Abakan Steppe, in the tracts between Askys and Ust Abakansk, where collected by me in several places. especially along dried up brooks' courses, in thickets, among stones and gravel, and in similar localities.

The whole plant is completely glabrous. The stem is simple, generally 10—15 cm., rarely up to 20 cm. high, bearing generally only 1 terminal, nodding flower, rarely 2—3 farther down the stem. The sessile leaves, which are nearly clasping at the base, lanceolate, sharply denticulate at the margin, with appressed teeth, are 2—3,5 cm. long, and to 5 mm. broad, with a distinct midrib. The leaves are generally rather approximate, especially so in the lower parts of the stem, where also the broadest leaves are to be found, becoming upwards gradually more

Fig. 114. *Adenophora liliifolia* Ledeb. f. *genuina* modif. *nana* Korsh. (1/1).

scattered and narrower, to linear. The flowers are of an azure colour, about 15—20 mm. long, with protruding styles. Collected in full flower in July.

Distribution: The species is distributed from the eastern part of middle Europe, from East-Prussia to the north, Switzerland, Bohemia, Austria, to northern Italy to the south, and eastwards through middle and southern Russia, Caucasia, south-western Asia to Russian Turkestan, southern Siberia, northwards to about 57° north lat., northern Mongolia, Corea, northern China, Japan.

Compositae ADANS.

Solidago Virgaurea L. Spec. Pl. ed. II (1763) p. 1235; Ledeb. Fl. Alt. IV, p. 101; Turczan. Cat. Baical. no. 598; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 431; Ledeb. Fl. Ross. II, p. 493; Turczan. Fl. Baical.-Dahur. (1846) p. 160, no. 584; Herder, Pl. Radd. (1865) p. 394, no. 64; Крыл. Фл. Алт. III (1904) p. 583.

It appears from the material brought home, originating from various parts of southern Siberia and the Urjankai country, that the species here is glabrate, only the upper parts of the stem and the branches in the thyrsus being generally slightly hairy. The leaves are comparatively narrow, entire, or the lower ones very slightly dentate, glabrous, also along the nerves, always distinctly, but shortly ciliate. The specimens are also characteristic in having the achenes nearly glabrate, only very slightly hairy, never so much as is especially the case in Scandinavian specimens, in which the achenes are nearly pubescent; in their lower half they are generally even completely glabrous, only the upper half of the achenes being beset with scattered, short hairs. At Ust Algiac I have also collected specimens of a form with completely glabrous achenes, with the exception of being sometimes furnished with some few short, scattered hairs in their uppermost parts. The bracts of the involucre are also generally completely glabrous. The branches of the thyrsus are generally short, bearing only one head. The ligules of the ray-flowers are sometimes seen to be distinctly toothed.

This species is pretty common in the territory traversed; in the Altaian I have collected it right up to 2000 m. above sea-level, in flower and with young fruits in June and July. Collected or noted by me in the following localities: about Minusinsk, at Karatus and Kushabar, along the river Amyl (common), Ust Algiac, the Altaian, Ust Sisti-kem, Ust Kamsara, Ust Tara-kem, about the Dora Steppe, and in several places along the banks of the Bei-kem.

Distribution: Europe, Caucasia, western and south-western Asia to Turkestan and the Himalayas, Siberia, northwards to past 70° north latitude, and eastwards to Behring's Ocean and the Sea of Okhotsk, northern Mongolia, eastern Asia, Sakhalin, Japan, North America.

Aster alpinus L. Spec. Pl. ed. II (1763) p. 1226; Ledeb. Fl. Alt. IV, p. 95; Turczan. Cat. Baical. no. 580; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 422; Ledeb. Fl. Ross. II, p. 472;

Turczan. Fl. Baical.-Dahur. (1846) p. 141, no. 567; Herder, Pl. Radd. (1865) p. 375, no. 39; Крыл. Фл. Алт. III (1904) p. 585.

Scattered about Minusinsk, where it especially seemed to occur on grass-grown, not too dry declivities; besides, collected by me on the steppes between Minusinsk and Ust Abakansk, in thicket of *Caragana arborescens*, together with *Iris ruthenica*, *Fragaria viridis*, *Stellaria graminea*, *Solidago Virgaurea*, and others, and about Karatus. In full flower at the beginning of June; the fruits ripen already in the middle of June. In the Urjankai country the species is also rather frequently to be met with, viz. near Ust Sisti-kem, in dry, sandy woods of larch and pine, on declivities at Ust Kamsara, and at Ust Tara-kem.

Distribution: Middle, southern and south-eastern Europe, Caucasia, western and south-western Asia to Turkestan and Afghanistan, Siberia, northwards to about 60° north lat., and eastwards to Kamtchatka, northern Mongolia, northern China, North America.

Aster Tripolium L. Spec. Pl. ed. II (1763) p. 1226; Ledeb. Fl. Alt. IV, p. 98; Turczan. Fl. Baical.-Dahur. (1846) p. 146, no. 572; Herder, Pl. Radd. (1865) p. 382, no. 49; Крыл. Фл. Алт. III (1904) p. 590. *Tripolium vulgare* Nees, Gen. et Spec. *Aster.* (1832) p. 153; Turczan. Cat. Baical. no. 586; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 423; Ledeb. Fl. Ross. II, p. 477.

On the borders of the salt-lake Tagarski osero, together with *Plantago maritima* subspec. *ciliata*, *P. Cornuti*, *Lepidium crassifolium*, *Saussurea crassifolia*, *Triglochin maritima*, and others. With young flower-buds at the beginning of July.

Distribution: On the coasts and salt marshes of Europe, Caucasia and western Asia to Turkestan, southern Siberia, eastwards to the Amoor Province, China, Sakhalin, Japan, North Africa.

Aster altaicus Willd. Enum. Pl. Hort. Berol. p. 881; Ledeb. Fl. Alt. IV, p. 99; Крыл. Фл. Алт. III (1904) p. 587. *Calimeris altaica* Nees, Gen. et Spec. *Aster.* (1832) p. 228; Turczan. Cat. Baical. no. 590; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 428; Ledeb. Fl. Ross. II, p. 482; Turczan. Fl. Baical.-Dahur. (1846) p. 152, no. 577; Herder, Pl. Radd. (1865) p. 386, no. 56.

Pretty common in the steppe area about Minusinsk, where it especially seemed to prefer not too dry places, for instance along borders of fields on the Abakan Steppe, near habitations, such as Askys, in dry meadows near Ust Kamuishto, and among stones and gravel on the islets in the river Abakan.

Krylow, l. c., separates of this species 2 forms from southern Siberia:

f. typicus Krylow is especially characterized by its low, decumbent, nearly trailing stems, being branched from the very base. The whole plant is rather densely beset with short, appressed hairs, and, besides — especially as regards the leaves and the upper parts of the stem — rather densely glandular. This form I have found to be the most common one in the territory explored.

f. medius Krylow has the stem higher, to 60 cm., strict, commonly only in the

upper parts furnished with rather long, spreading branches. The upper parts of the stem are beset with rather long, spreading hairs. The bracts of the involucre rather densely ciliate, only sparingly glandulous, or sometimes nearly wanting glandulair hairs. On the islets in the Lower Abakan I have collected, among stones and gravel, specimens somewhat recalling this one, and possibly constituting intermediates between the 2 above forms. Collected, with flower-buds and some few flowers just opened, in the second half of June. Quite typical specimens of *f. medius* do not occur in my collections from the Minusinsk district.

Distribution: The steppe regions of southern Siberia, eastwards to the Amoor Province, northern Mongolia, southwards to northern Persia and Turkestan, Afghanistan, Baloochistan, Tibet and the Himalayas. This species is also recorded from eastern Asia, where it has possibly been confounded with *Heteropappus hispidus* Less.

Arctogeron gramineus (L.) DC. Prodrom. V, p. 261; Turczan. Cat. Baical. no. 597; Ledeb. Fl. Ross. II, p. 484; Turczan. Fl. Baical.-Dahur. (1846) p. 155, no. 579; Herder, Pl. Radd. (1865) p. 388, no. 59. *Erigeron gramineus* L. Spec. Pl. ed. II (1763) p. 1212.

Pretty common on the Abakan Steppe, near Askys and Ust Kamuishto, where especially occurring on dry, hot and sunny Devonian rocks of sandstone, associated with *Ephedra vulgaris, Atraphaxis frutescens*, etc. Specimens collected in the middle of June are already nearly past flowering. Ledebour, l. c., records „Folia radicalia angustissime linearia dense ciliata." All of the specimens collected by me, however, have the leaves completely glabrous and shining, only sometimes with a single row of rather short, coarse, and slightly appressed bristles along the margin. The peduncle is 5—10 cm. high, sulcate, densely beset with rather long, diffuse, curly hairs, bearing generally a single linear leaf, 6—7 mm. long, and 0,5 mm. broad, frequently arising above the middle of the peduncle. Like the basal leaves, it is completely glabrous, only ciliate, and seemed to wither and fall off already during the ripening of the fruit. The achenes are 4—5 mm. long, 1,5—2 mm. broad, slightly compressed and curved, and densely beset with long, appressed hairs of a shining silver-white.

Distribution: South-eastern Siberia.

Galatella punctata Lindl. in DC. Prodrom. V, p. 255; Ledeb. Fl. Ross. II, p. 478; Herder, Pl. Radd. (1865) p. 383, no. 51; Крыл. Фл. Алт. III (1904) p. 591. *Aster dracunculoides* L., Ledeb. Fl. Alt. IV, p. 97.

On dry, open declivities at Ust Kamsara, and in wooded steppes, larch forest, and the like, about Ust Tara-kem. Flowering and past flowering in the second half of August.

Distribution: Southern and eastern Europe, south-western Asia, southern Siberia, eastwards to about the government of Irkutsk, northern Mongolia.

Galatella daurica DC. Prodrom. V, p. 256; Turczan. Cat. Baical. no. 587; Ledeb. Fl. Ross. II, p. 480; Turczan. Fl. Baical.-Dahur. (1846) p. 148, no. 573; Herder, Pl. Radd.

(1865) p. 383, no. 50. *Aster dauricus* (DC.) Benth. ex Baker Gard. Chron. (1885) I, p. 208.

Near Ust Algiac, on the Sisti-kem. Nearly done flowering in the early days of August.

Distribution: Through southern Siberia and northern Mongolia, from the Sayansk district, eastwards to the Amoor Province and Manchooria.

Erigeron acer L. Spec. Pl. ed. II (1763) p. 1211; Ledeb. Fl. Alt. IV, p. 89; Turczan. Cat. Baical. no. 594; Ledeb. Fl. Ross. II, p. 488; Turczan. Fl. Baical.-Dahur. (1846) p. 158, no. 581; Herder, Pl. Radd. (1865) p. 390, no. 61, p. p.; Крыл. Фл. Алт. III (1904) p. 593.

Rather frequent in the Urjankai country, especially on dry hills, in thickets, and the like, at Ust Algiac, Ust Sisti-kem, Ust Kamsara, and on dry flood-plains at Ust Tarakem. Collected in July and August.

Distribution: Throughout Europe, Caucasia and south-western Asia, Siberia, in the Yenisei valley northwards to 71° 20′ north lat., northern Mongolia, eastern Asia, North America.

Erigeron elongatus Ledeb. Fl. Alt. IV, p. 91; Turczan. Cat. Baical. no. 595; Ledeb. Fl. Ross. II, p. 487; Turczan. Fl. Baical.-Dahur. (1846) p. 158, no. 582. *E. acris L. γ elongatus* (Ledeb.) Krylow, Фл. Алт. III (1904) p. 594; Herder, Pl. Radd. (1865) p. 391, no. 61.

The material collected differs from the Scandinavian specimens I have had for comparison, by having the achenes rather densely beset with comparatively long, appressed hairs, while the Scandinavian ones have the fruits glabrous or nearly so, at any rate only at the summit slightly puberulent. The bracts of the involucre are glabrous or mostly very finely and slightly puberulent, of a green colour, with violet summits. The pappus-bristles white or slightly yellowish.

Scattered in the subalpine wooded tracts of the Sayansk district, about the Upper Amyl, where collected by me in flower and with young fruits in the first half of July.

Besides, I have collected near Ust Algiac, in the subalpine wooded tracts, some specimens differing in various respects. The stem is long and slender, slightly sulcate, green, completely glabrous below, only very sparingly pubescent above. The leaves are narrow, to 5 mm. broad; the lower ones linear-lanceolate, gradually tapering towards the base, obtusely rounded or slightly acuminate at the top, ciliate, completely glabrous for the rest. The margin of the leaves is even and entire, never denticulate or incised. The upper leaves narrowly lanceolate, tapering towards the top, and subacute. The raceme is especially characterized by its few and comparatively small heads, the peduncles of which are 3—5 cm. long, always unramified, each of them, accordingly, bearing one single head, reaching up to different heights. The heads are few, numbering only 6—8, and are distinguished by being comparatively small, scarcely exceeding 1 cm. in diameter when pressed; the involucre is campanulate, not hemispheric or spreading; its

bracts, of which the inner ones are 7—8 mm. long, are of a dark green, with reddish violet points, glabrous or very slightly hairy and dotted. The pappus is white, or rarely slightly yellowish, never reddish or rust-coloured, of about the same length as the involucral bracts, and, accordingly, not protruding, as in the typical form. The flowers are of about the same length as the pappus. The achenes are somewhat flattened, slightly silky-hairy or nearly glabrous.

The specimens thus especially differ from the typical *E. elongatus* by having comparatively narrower leaves, fewer, more shortly peduncled and smaller heads, the involucres of which are campanulate, and by the pappus, which is white, of the same length as the green involucre. This material much recalls specimens of *f. politus* (Fries spec.), which I have seen in Fries, Herbarium Normale Fasc. 15, no. 3, but also deviates from the latter by a more vigorous growth, by a completely white pappus and a green involucre.

Distribution: Europe, Caucasia and south-western Asia to Turkestan and Afghanistan, Siberia, northwards to past 70° north lat., eastwards to the Sea of Okhotsk, northern Mongolia. The latter form is also recorded from North America.

Brachyactis ciliata Ledeb. Fl. Ross. II, p. 495; Крыл. Фл. Алт. III (1904) p. 597. *Erigeron ciliatus* Ledeb. Fl. Alt. IV, p. 92. *Conyza altaica* DC. Prodrom. V, p. 380; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 433.

On the steppes south of Minusinsk; with flowers in the first half of July.

Distribution: Southern Siberia, eastwards to the government of Yeniseisk, western Asia to Turkestan.

Antennaria dioica Gärtn. De Fruct. et Sem. II, p. 510; Turczan. Cat. Baical. no. 641; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 477; Ledeb. Fl. Ross. II, p. 612; Turczan. Fl. Baical.-Dahur. (1847) p. 7, no. 633; Крыл. Фл. Алт. III (1904) p. 599. *Gnaphalium dioicum* L. Spec. Pl. ed. II (1763) p. 1199; Ledeb. Fl. Alt. IV, p. 55; Herder, Pl. Radd. (1867) p. 412, no. 137.

Pretty common in the Sayansk district, in dry places in the subalpine woods about the Upper Amyl, the rivers Algiac and Sisti-kem, where collected by me in several places. All of the specimens collected belong to *f. corymbosa* Hartm.

Distribution: Europe, Caucasia, western Asia, Siberia, northwards to about 68½° north lat., eastwards to the Sea of Okhotsk, northern Mongolia.

Leontopodium alpinum Cassini in Dict. Sc. Nat. XXV, p. 474; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 478; Ledeb. Fl. Ross. II, p. 613; Крыл. Фл. Алт. III (1904) p. 600. *L. sibiricum* Cass. l. c. p. 475; Turczan. Cat. Baical. no. 642; Ledeb. l. c. p. 614; Turczan. Fl. Baical.-Dahur. (1847) p. 8, no. 633. *Gnaphalium Leontopodium* Scop., Ledeb. Fl. Alt. IV, p. 56; Herder, Pl. Radd. (1867) p. 417, no. 139.

This species is very common in sandy meadows in woods, among *Larix* and *Betula*,

on the Upper Bei-kem, in the subalpine tracts between the rivers Kamsara and the Tarakem, where I have observed it in abundance at the end of August.

Distribution: The Pyrenees, Alps, and Carpathian mountains, western Asia, Turkestan, Pamir, Tibet, the Himalayas, southern Siberia, eastwards as far as the Amoor Province, northern Mongolia, China, Manchooria, Corea, Sakhalin, Japan, North America.

Gnaphalium silvaticum L. Spec. Pl. ed. II (1763) p. 1200; Ledeb. Fl. Alt. IV, p. 57; Ledeb. Fl. Ross. II, p. 609; Turczan. Fl. Baical.-Dahur. (1847) p. 5, no. 631; Herder, Pl. Radd. (1867) p. 408, no. 134; Крыл. Фл. Алт. III (1904) p. 601. *G. rectum* Turczan. Cat. Baical. no. 639.

The material brought home shows that the species varies considerably, especially in the density of the spike, the shape of the leaves and the density of the pubescence. There occur both *f. brachystachyum* Ledeb. l. c. and *f. macrostachyum* Ledeb. l. c., with various intermediates. Near Kushabar I have collected some specimens with the involucral bracts of a light straw-colour, whereby much recalling *f. stramenticium* Beck v. Mannagetta, Fl. Nied. Oester. II (1893) p. 1178. Pretty common in the subalpine regions about the Upper Amyl, at Ust Algiac, Ust Sisti-kem, and Ust Tara-kem. In the Altaian I have found it right up to about 1800 m. above sea-level.

Distribution: Europe, Caucasia, south-western Asia to Turkestan, Siberia, northwards to about 68° north lat., eastwards roughly to Lake Baikal, northern Mongolia, North America.

Gnaphalium uliginosum L. Spec. Pl. ed. II (1763) p. 1200; Turczan. Cat. Baical. no. 640; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 475; Ledeb. Fl. Alt. IV, p. 57; Ledeb. Fl. Ross. II, p. 609; Turczan. Fl. Baical.-Dahur. (1847) p. 4, no. 630; Herder, Pl. Radd. (1867) p. 406, no. 133; Крыл. Фл. Алт. III (1904) p. 602.

In moist, loamy places near Kushabar, on the river Amyl, and in the Urjankai country, about Ust Algiac and at Ust Sisti-kem.

Distribution: Europe, except the most northern parts, Caucasia, western Asia, Siberia, northwards to past 70° north lat., eastwards to the Sea of Okhotsk and the Amoor Province, Manchooria, Corea, Sakhalin, Japan, North America, probably introduced from Europe.

Helichrysum arenarium (L.) DC. Fl. Franc. IV, p. 132; Ledeb. Fl. Ross. II, p. 607; Крыл. Фл. Алт. III (1904) p. 603. *Gnaphalium arenarium* L. Spec. Pl. ed. II (1763) p. 1195; Ledeb. Fl. Alt. IV, p. 55; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 473.

On the Abakan Steppe, in dry, sandy places towards Askys; with young flowers in the middle of June.

Distribution: Europe, northwards to southern Sweden, southwards to France, Switzerland, Serbia, Bulgaria, Caucasia, south-western Asia to Persia, Trans Caspia and Turkestan, southern Siberia, eastwards roughly to the river Yenisei.

Inula salicina L. Spec. Pl. ed. II (1763) p. 1238; Ledeb. Fl. Alt. IV, p. 93; Turczan. Cat. Baical. no. 599; Ledeb. Fl. Ross. II, p. 504; Turczan. Fl. Baical.-Dahur. (1846) p. 162, no. 585; Herder, Pl. Radd. (1865) p. 396, no. 66; Крыл. Фл. Алт. III (1904) p. 605.

The specimens collected are characteristic in having the narrow, cylindrical achenes sometimes even rather densely beset with fine, spreading, curly, white, silky hairs, and not completely glabrous as in the Scandinavian ones. The achenes are, for the rest, rather varying in hairiness, being sometimes very densely, nearly white-canescent, with all transitions to very sparsely pubescent. Completely glabrous achenes, however, are not to be found in the material collected by me from southern Siberia. In the specimens rays are wanting or much reduced, whereby agreeing with *f. discoidea* N. Bryhn. There are to be found completely glabrous as well as more or less hairy specimens. The stem is generally pubescent below, glabrous or sometimes sparsely glandulous above. In point of external habitus, for the rest, the specimens agree perfectly with Scandinavian material of comparison.

Occurring on islets in the river Abakan, in thickets along the banks, etc., where I have collected young, as yet flowerless specimens in June, and also about Kushabar, where I have collected it in flower and with young fruits about the middle of July. At the end of August found by me about Bjelosarsk, in thickets near the river.

Distribution: Europe, northwards to middle Scandinavia, Caucasia, south-western Asia to Turkestan, northern Mongolia, Siberia, northwards to about 61° north latitude, and eastwards to the Amoor Province, Manchooria, Corea, China, Japan.

Inula britannica L. Spec. Pl. ed. II (1763) p. 1237; Ledeb. Fl. Alt. IV, p. 94; Turczan. Cat. Baical. no. 600; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 435; Ledeb. Fl. Ross. II, p. 505; Turczan. Fl. Baical.-Dahur. (1846) p. 162, no. 586; Herder, Pl. Radd. (1865) p. 396, no. 67; Крыл. Фл. Алт. III (1904) p. 606.

In Asia this species is subjected to great variations. The specimens collected are comparatively low, generally 15—20, rarely to 30 cm. high, each plant only with 1—2, or rarely 3 very small heads, only 2,3—2,5 cm., rarely to 3 cm. in diameter. The pappus comparatively short, on an average about 4 mm. long, the hairs on the achene rather spreading, not appressed. The leaves are comparatively narrow, to 11 mm. broad, and 6—7 times as long, entire, or only with nearly imperceptible, scattered teeth, greyish-tomentose beneath, glabrous or nearly so above. The stem is densely pubescent, sometimes glandulous in the upper part. Young specimens, with flowers as yet not fully opened, have been found by me at Ust Abakansk, in open brush-wood, near the banks of the river, and with fully opened flowers at the beginning of August, near the mouth of the Kamsara, and at Bjelosarsk.

Distribution: Europe, from southern Sweden to France, northern Italy and Turkey, Caucasia, south-western Asia to Turkestan, Siberia, northwards to 68½° north lat., eastwards to the Sea of Okhotsk, northern Mongolia, Manchooria, Corea, Sakhalin, Japan.

Bidens tripartitus L. Spec. Pl. ed. II (1763) p. 1165; Ledeb. Fl. Alt. IV, p. 53; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 400; Ledeb. Fl. Ross. II, p. 516; Turczan. Fl. Baical.-Dahur. (1846) p. 168, no. 589; Herder, Pl. Radd. (1865) p. 399, no. 71; Крыл. Фл. Алт. III (1904) p. 608.

On the banks of the river Kamuishto, and on the borders of ditches between Minusinsk and Kushabar. With young flower-buds in the middle of July.

Distribution: Europe, except the extreme north, Caucasia, south-western Asia to Turkestan, Tibet and the Himalayas, Siberia, northwards to about 66° north lat., eastwards to the Sea of Okhotsk, Mongolia, Manchooria, Japan, North Africa, Australia.

Achillea Millefolium L. Spec. Pl. ed. II (1763) p. 1267; Ledeb. Fl. Alt. IV, p. 124; Ledeb. Fl. Ross. II, p. 531; Herder, Pl. Radd. (1865) p. 403, no. 76; Крыл. Фл. Алт. III (1904) p. 611. *A. setacea* Waldst. et Kit. Pl. Rar. Hung. I, p. 82; Turczan. Fl. Baical.-Dahur. (1846) p. 174, no. 594.

This plant is very common in the Minusinsk district, in dry meadows, and the like, and varies considerably as to stature, hairiness, breadth of the segments of the leaves, size of the heads, colour, etc. I have observed it to be pretty common on islets in the river Abakan, in several places in dry steppe meadows about Minusinsk, at Kushabar, Ust Algiac, Ust Sisti-kem, Ust Tara-kem, and near the Dora Steppe.

Besides the typical plant, I have found, in dry, sandy places on islets in the Yenisei, near Minusinsk, and on the Abakan Steppe, specimens of *f. setacea* (Waldst. et Kit.) Ledeb. l. c. p. 532, a steppe form, especially distinguished by its dense pubescence, by filiform leaf-segments, and smaller heads, measuring 3,5—4 mm. in length, and 2 mm. in breadth.

Distribution: Europe, the Caucasus, south-western Asia to Turkestan and the Himalayas, Siberia, northwards to past 70° north lat., eastwards to the Sea of Okhotsk, northern Mongolia, Manchooria, China, and North America. The form *setacea* occurs in dry, sunny places in middle Europe, the steppe region in eastern Europe, southern Siberia, and northern Mongolia.

Achillea Ptarmica L. Spec. Pl. ed. II (1763) p. 1622; Herder, Pl. Radd. (1865) p. 406, no. 78. *Ptarmica vulgaris* Clusius, Hist. Stirp. Rar. Panon. II (1576) p. 12; Turczan. Fl. Baical.-Dahur. (1846) p. 173, no. 593 (ex parte); Ledeb. Fl. Ross. II, p. 529; Крыл. Фл. Алт. III (1904) p. 613.

On islets in the Yenisei, near Minusinsk, and in slightly moist meadows on the river Abakan, near Askys. With young, not opened flower-buds at the beginning of June. The specimens seemed to belong to *f. cartilaginea* (Ledeb. spec.) DC. Prodrom. VI, p. 23.

Distribution: Europe, except the most northern and southern portions, Caucasia and south-western Asia, Siberia, northwards to about 69½° north lat., eastwards to Kamtchatka and the Amoor Province, Manchooria, Corea, North America.

Achillea impatiens L. Spec. Pl. ed. II (1763) p. 1266; Turczan. Cat. Baical. no. 603; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 442; Ledeb. Fl. Alt. IV, p. 123; Herder, Pl. Radd.

(1865) p. 408, no. 79. *Ptarmica impatiens* DC. Prodrom. VI, p. 22; Ledeb. Fl. Ross. II, p. 527; Turczan. Fl. Baical.-Dahur. (1846) p. 171, no. 591; Крыл. Фл. Алт. III (1904) p. 615.

In somewhat dry meadows on islets in the river Abakan, on dry hills, in thickets of foliage trees, and the like, on the road between Minusinsk and Kushabar, near Ust Algiac, at Ust Sisti-kem, and Ust Tara-kem. In full flower at the beginning of July.

Distribution: Siebenbürgen, Siberia, northwards to past 70° north lat., eastwards roughly to Lake Baikal, northern Mongolia.

Chrysanthemum Leucanthemum L. var.**ircutianum** (Turczan. spec.) Krylow, Фл. Алт. III (1904) p. 618. *C. ircutianum* Turczan. Cat. Baical. no. 605. *Leucanthemum ircutianum* DC. Prodrom. VI, p. 47; Turczan. Fl. Baical.-Dahur. (1846) p. 177, no. 596; Ledeb. Fl. Ross. II, p. 543. *C. Leucanthemum* in Ledeb. Fl. Alt. IV, p. 115. *Leucanthemum vulgare* Lam., Herder, Pl. Radd. (1865) p. 412, no. 84.

This variety, which differs from the typical plant by having the achenes of the ray-flowers furnished with a short, membranous pappus, more or less toothed and tattered at the top, especially occurs in the most eastern range of the species. In my material there are to be found all transitions between specimens with a well developed pappus, to nearly 1 mm. long, and specimens with the pappus nearly altogether wanting or only traceable as a low mound on the upper ends of the achenes. A total absence of pappus I have not been able to point out among this Siberian material. Some specimens have it, however, only unilaterally developed, and then it seemed — to judge from my material — always to occur on the ventral side, that is, on the open side of the flower facing the centre of the head inwards. By an examination of the collections of this species at the University of Christiania, I have been able to point out that the pappus is sometimes also to be found on the achenes of the rays among Scandinavian specimens, and, accordingly, that there occur forms in Scandinavia agreeing perfectly with var. *ircutianum*, a fact showing that this variety is hardly distinct from the typical European plant. I have, nevertheless, chosen to enter the Siberian ones collected by me, under the name of var. *ircutianum*, as it appears — according to my experience — that the pappus in the specimens of the East is mostly larger, more distinctly developed, and occurs as a general rule, while, in European material, the pappus is generally very small and indistinct, only appearing as a rare exception. Thus, there is, after all, a difference between the specimens to be found in the western and those occurring in the eastern ranges of the species, albeit only a difference of degree. The fruits are often nearly completely coal black when ripe, with about 10 longitudinal ribs of a light yellow.

Of rather common occurrence in open forest of foliage trees, in natural meadows, on grass-grown river-banks, etc., in many places on the road between Minusinsk and Kushabar, where I have collected it in flower and partly done flowering towards the middle of July. The specimens collected vary considerably in the size of the heads, the shape and incision of the leaves.

Distribution: Europe, except the arctic regions and southern parts, Caucasia, Sibe-

ria, northwards to about 61° north lat., and eastwards roughly to Lake Baikal. Var. *ircutianum* occurs chiefly in the Altai region, and eastwards to Lake Baikal.

Chrysanthemum sibiricum Fischer in litt. ex DC. Prodrom. VI, p. 46; Крыл. Фл. Алт. III (1904) p. 619. *Leucanthemum sibiricum* DC. l. c.; Ledeb. Fl. Ross. II, p. 541; Turczan. Fl. Baical.-Dahur. (1846) p. 176, no. 595; Herder, Pl. Radd. (1865) p. 413, no. 85. *C. arcticum* Ledeb. Fl. Alt. IV, p. 115 (non L.).

This species, which is readily distinguished by its reddish or violet rays, I have found scattered in thickets of foliferous and coniferous trees between Minusinsk and Karatus, and on slopes at Ust Algiac and near Ust Kamsara. In full flower in July.

Distribution: North-eastern Russia, Siberia, the Amoor Province, Manchooria, Corea, China, northern Mongolia. In the most eastern range of the species it occurs in a somewhat deviating form, *β acutiobum* DC.

Matricaria discoidea DC. Prodrom. VI, p. 50; Ledeb. Fl. Ross. II, p. 544; Herder, Pl. Radd. (1865) p. 409, no. 82; Крыл. Фл. Алт. III (1904) p. 623.

As a weed about the road between Karatus and Kushabar, in some places pretty common. It was to be found accompanying plants such as *Trifolium repens*, *Malva borealis*, and others, in full flower towards the middle of July. The specimens collected are distinguished by having the stems strict, and generally simple; the segments of the leaves are very fine and filiform, generally 0,3—0,5 mm. broad. For the rest, the plants agree perfectly with the Norwegian specimens I have had for comparison. In the somewhat oblique achenes, furnished with 4—5 prominent stripes, of a characteristic, reddish brown, can be observed a very small and reduced pappus, only appearing as an obscure crown.

Distribution: The species is a native of the Pacific coast of North America and the regions about the Sea of Okhotsk and Kamtchatka in north-eastern Asia, from where recorded already by Ledebour (1844—46). From here scattered, especially along the railways, over large parts of North America, and further to Europe, where spreading quickly of late years, mostly as a weed in and about the greater towns. In eastern Europe it is not frequent, but has previously been observed as far east as western Siberia (Omsk and Tomsk); to the Minusinsk district, heretofore known as its most eastern locality, it has probably been diffused from the west. Not yet met with in Trans Baikal or China, but has also in eastern Asia a tendency to extend, especially along the railways.

Matricaria inodora L. Fl. Suec. ed. II, no. 765; Ledeb. Fl. Ross. II, p. 545; Крыл. Фл. Алт. III (1904) p. 624. *Chrysanthemum inodorum* L. Spec. Pl. ed. II (1763) p. 1253. *Tripleurospermum inodorum* C. H. Sch. Bip., Herder, Pl. Radd. (1865) p. 410, no. 83.

On the steppes about Minusinsk and Karatus, with leaves and young flowers at the beginning of July.

Distribution: Europe, except the extreme south, Caucasia, south-western Asia to Russian Turkestan, Siberia, northwards to towards 71° north lat., Manchooria, North America.

Matricaria ambigua (Ledeb.) Maxim. (in schedulis); Крыл. Фл. Алт. III (1904) p. 625. *Pyrethrum ambiguum* Ledeb. Fl. Alt. IV, p. 118; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 447; Ledeb. Fl. Ross. II, p. 547.

In the Altaian, above the tree limit, at an altitude of about 2000 m. above sea-level, in slightly moist places. In full flower at the end of July.

Distribution: Arctic Europe, arctic Siberia, eastwards to the Tshuktsher Peninsula, Turkestan, the Thian-Shan, the Altai and Sayansk mountains, Manchooria, northern Japan, North America, Greenland.

Tanacetum vulgare L. Spec. Pl. ed. II (1763) p. 1148; Ledeb. Fl. Alt. IV, p. 60; Ledeb. Fl. Ross. II, p. 601; Turczan. Fl. Baical.-Dahur. (1846) p. 208, no. 628; Herder, Pl. Radd. (1865) p. 417, no. 88; Крыл. Фл. Алт. III (1904) p. 626. (Incl. *T. boreale* Fischer).

Near the banks of the river Abakan, at Ust Abakansk, in shady places in thickets of foliage trees. Only leaves in June. The species is also pretty common in the Sayansk district, where observed by me in several places, especially near habitations, in the Amyl valley, at Kushabar, Ust Algiac, Ust Sisti-kem, Ust Kamsara, and on the river Yenisei, between the Kemchik and Minusinsk. In full flower in August. There occur here both *f. genuina* Trautv. and *f. boreale* (Fisch.) Trautv.

Distribution: Europe, except the extreme south, Caucasia, south-western Asia to Turkestan, Siberia, northwards to past 70° north lat., eastwards to the Tshuktsher Peninsula, Kamtchatka and the Amoor Province, northern Mongolia, Manchooria, Sakhalin. Introduced into North America.

Artemisia Dracunculus L. Spec. Pl. ed. II (1763) p. 1189; Ledeb. Fl. Alt. IV, p. 88; Turczan. Cat. Baical. no. 610, excl. var.; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 451; Ledeb. Fl. Ross. II, p. 563; Turczan. Fl. Baical.-Dahur. (1846) p. 183, no. 601; Herder, Pl. Radd. (1867) p. 202, no. 96; Крыл. Фл. Алт. III (1904) p. 633.

On islets in the river Yenisei, in rather dry places, where collected with young flower-buds in the last days of June. In the Urjankai country I have found the species on the steppes about the Ulu-kem.

Distribution: Middle and south-eastern Europe, Siberia, northwards to about 63° north lat., and eastwards to the Sea of Okhotsk, northern Mongolia, Manchooria, south-western Asia and Persia to Turkestan, Pamir, Afghanistan, and western Tibet.

Artemisia glauca Pallas in Willd. Spec. Pl. III, p. 1831; Ledeb. Fl. Alt. IV, p. 87; Turczan. Cat. Baical. no. 611; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 452; Ledeb. Fl. Ross. II, p. 563; Turczan. Fl. Baical.-Dahur. (1846) p. 184, no. 602; Herder, Pl. Radd. (1867) p. 203, no. 97; Крыл. Фл. Алт. III (1904) p. 633.

On the steppe on the river Abakan, near Ust Abakansk, on dry, hot declivities at Ust Sisti-kem, on the Bei-kem, above the Tapsa, and on the steppes about the Ulu-kem. Nearly past flowering in the last days of August.

Distribution: Eastern Russia, southern Siberia, eastwards roughly to Lake Baikal, south-western Asia, the northern Himalayas, northern Mongolia, northern China.

Artemisia commutata Besser, Dracunc. etc. (1835) p. 70; Turczan. Cat. Baical. no. 614; Ledeb. Fl. Ross. II, p. 567; Крыл. Фл. Алт. III (1904) p. 635. *A. campestris* Ledeb. Fl. Alt. IV, p. 86, ex parte; Turczan. Fl. Baical.-Dahur. (1846) p. 185, no. 604; Herder, Pl. Radd. (1867) p. 206, no. 101.

This species is very nearly allied to *Artemisia campestris* L., and is distinguished from it only by comparatively trite characters, occurring as a substitute for this species in eastern Asia. All of the specimens collected are rather densely pubescent, with rather small heads, the length of which is about 2—2,5 mm.; they therefore belong to *f. altaica* Krylow, l. c. Occurring scattered on the Abakan Steppe, near Ust Kamuishto, especially on dry, stony slopes, where I have collected it with young, as yet not fully developed heads in the second half of June.

Distribution: Southern Siberia, roughly from the Altai region, northwards to about 64° north latitude, eastwards to the Amoor Province, northern Mongolia.

Artemisia scoparia Waldst. et Kit. Pl. Rar. Hungar. I, p. 66; Ledeb. Fl. Alt. IV, p. 87; Turczan. Cat. Baical. no. 615; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 454; Ledeb. Fl. Ross. II, p. 569; Turczan. Fl. Baical.-Dahur. (1846) p. 189, no. 606; Herder, Pl. Radd. (1867) p. 210, no. 102; Крыл. Фл. Алт. III (1904) p. 637.

On stony and gravelly river-banks, and on islets in the river Abakan, near Ust Abakansk. Specimens collected in the last days of June, are young, scarcely 20 cm. high, and completely flowerless. The specimens are characteristic in being densely silky-pubescent all over, and I therefore consider them to be identical with *f. villosa* Frøl. in Abh. Phys.-Øk. Ges. Kønigsberg (1887), which — at any rate according to the diagnosis — do not seem to be different from *f. sericea* Komarow, Фл. Маньчжурии III (1907) p. 652.

Distribution: Middle and south-eastern Europe, Caucasia, south-western Asia to Turkestan, Afghanistan, Tibet, the Himalayas and northern India, southern Siberia, northwards roughly to 58° north lat., eastwards to the Sea of Okhotsk, northern Mongolia, Manchooria, Corea, China, Japan.

Artemisia maritima L. Spec. Pl. ed. II (1763) p. 1186; Ledeb. Fl. Ross. II, p. 570; Turczan. Fl. Baical.-Dahur. (1846) p. 190, no. 607; Herder, Pl. Radd. (1867) p. 211, no. 103; Крыл. Фл. Алт. III (1904) p. 639.

On the Abakan Steppe, in saliferous soil, near salt marshes. Young, flowerless specimens at the end of June.

Distribution: Europe, northwards to southern Scandinavia, Caucasia and south-western Asia to Persia, Afghanistan, Turkestan, Tibet and the Himalayas, southern Siberia, eastwards to Trans Baikal, northern Mongolia.

Artemisia sacrorum Ledeb. in Mem. Acad. Petropol. V (1805) p. 571; Ledeb. Fl. Alt. IV, p. 72; Turczan. Cat. Baical. no. 528; Ledeb. Fl. Ross. II, p. 578; Turczan. Fl. Baical.-Dahur. (1846) p. 193, no. 611; Herder, Pl. Radd. (1867) p. 215, no. 106; Крыл. Фл. Алт. III (1904) p. 642.

This species is pretty common on islets in the river Abakan, and on the Abakan Steppe, especially in dry meadows, on stony declivities, etc. As all of the specimens collected, taken in the second half of June, only are young and flowerless, I have not been able to settle with any definiteness which forms of this much varying species occur here. I have, besides, observed this species in the Urjankai country — in the wooded steppe regions — on dry, open declivities at Ust Kamsara, and at Ust Tara-kem.

Distribution: Eastern Russia, Siberia, eastwards to the Sea of Okhotsk, northern Mongolia, eastern parts of Turkestan, Pamir, Tibet, northern India, Manchooria, Corea, China, Sakhalin.

Artemisia macrantha Ledeb. in Mem. Acad. Petropol. V (1805) p. 573; Ledeb. Fl. Alt. IV, p. 76; Ledeb. Fl. Ross. II, p. 581; Крыл. Фл. Алт. III (1904) p. 644.

On dry flood-plains at Ust Tara-kem, in full flower about the middle of August.

Distribution: Eastern Russia, southern Siberia, eastwards to about the government of Yakutsk, northern Mongolia.

Artemisia laciniata Willd. Spec. Pl. ed. III, p. 1845, excl. var. β; Ledeb. Fl. Alt. IV, p. 75; Turczan. Cat. Baical. no. 629; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 463; Ledeb. Fl. Ross. II, p. 581; Turczan. Fl. Baical.-Dahur. (1846) p. 195, no. 613; Herder, Pl. Radd. (1867) p. 218, no. 108; Крыл. Фл. Алт. III (1904) p. 645. Incl. *A. macrobotrys* Ledeb. Fl. Ross. II, p. 582.

Pretty common on the islets in the Lower Abakan and in the Yenisei, near Ust Abakansk, where especially occurring in dry meadows. Specimens taken in the month of June are as yet young and flowerless. They agree, however, perfectly with specimens I have seen in the herbarium of the Imperial Botanical Gardens in Petrograd. In the Urjankai country I have observed the species on declivities at Ust Tara-kem.

Distribution: Eastern portion of middle Europe, southern Siberia, eastwards to the Amoor Province, northern Mongolia, south-western Asia to Turkestan, Tibet and north-western India, Manchooria, northern Corea, northern China.

Artemisia latifolia Ledeb. in Mem. Acad. Petropol. V (1805) p. 569; Ledeb. Fl. Alt. IV, p. 70; Ledeb. Fl. Ross. II, p. 582; Herder, Pl. Radd. (1867) p. 221, no. 110; Крыл. Фл. Алт. III (1904) p. 648.

On the steppes about the Ulu-kem, past flowering at the end of August.

Distribution: Eastern Russia, southern Siberia, eastwards to the Amoor Province and Manchooria, Sakhalin.

Artemisia vulgaris L. Spec. Pl. ed. II (1763) p. 1188; Ledeb. Fl. Alt. IV, p. 82; Turczan. Cat. Baical. no. 631; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 465; Ledeb. Fl. Ross. II, p. 585; Turczan. Fl. Baical.-Dahur. (1846) p. 197, no. 615; Herder, Pl. Radd. (1867) p. 222, no. 112; Крыл. Фл. Алт. III (1904) p. 650.

This species is very common everywhere in the Minusinsk district and on the islets in the rivers Yenisei and Abakan, where occurring in thickets, in dry meadows, etc. Specimens taken in June have only leaves. The species is here much varying. The following 2 forms seemed to be the most frequent ones: *f. communis* Ledeb. l. c., and *f. latiloba* Ledeb. l. c. On islets in the Yenisei, between Minusinsk and Ust Abakansk, I have collected as yet flowerless specimens of a form which is especially characteristic in having the leaves long-petioled, the petioles always destitute of the auricles at the base. The stem and under sides of the leaves are white-canescent, the upper sides green and sparingly pubescent. The segments of the leaves are narrow, of equal breadth, 6—7, rarely to 8 mm. broad, far apart, rounded or very shortly acuminate towards the apex. Number of the pinnae generally 2 on either side, each pinna being generally 3-lobed. As all of the specimens collected are young and completely destitute of flowers, I have not been able to identify this form with certainty. The species is, besides, rather frequent in the Urjankai country, where collected by me at Ust Algiac, Ust Sisti-kem, and Ust Kamsara, in dry thickets, on slopes, and the like.

Distribution: Europe, except the most southern parts, Caucasia, south-western Asia to Turkestan, the Himalayas, India, the East Indies, Siberia, northwards to past 74° north lat., eastwards to the Tshuktsher Peninsula, Kamtchatka and the Amoor Province, northern Mongolia, Manchooria, Corea, China, Japan, Sakhalin, North America.

Artemisia sericea Weber in Stechm. Art. p. 16; Turczan. Cat. Baical. no. 618; Ledeb. Fl. Ross. II, p. 595; Turczan. Fl. Baical.-Dahur. (1846) p. 203, no. 623; Herder, Pl. Radd. (1867) p. 236, no. 127; Крыл. Фл. Алт. III (1904) p. 653. *A. holosericea* Ledeb. Fl. Alt. IV, p. 63.

On mountain slopes on the Abakan Steppe, near Ust Kamuishto, and in dry, sandy meadows on islets in the river Abakan, where I have collected young, defective and flowerless specimens in the second half of June.

Distribution: Middle Russia, south-western Asia to Russian Turkestan, Siberia, eastwards roughly to Trans Baikal, Sakhalin.

Artemisia frigida Willd. Spec. Pl. III, p. 1838; Ledeb. Fl. Alt. IV, p. 65; Turczan. Cat. Baical. no. 621; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 469; Ledeb. Fl. Ross. II, p. 597; Turczan. Fl. Baical.-Dahur. (1846) p. 206, no. 625; Herder, Pl. Radd. (1867) p. 238, no. 129; Крыл. Фл. Алт. III (1904) p. 654.

On dry, open declivities at Ust Kamsara, in full flower about the middle of August.

Distribution: Eastern Russia, southern Siberia, northern Mongolia, Manchooria, North America.

Artemisia Sieversiana Willd. Spec. Pl. III, p. 1845; Ledeb. Fl. Alt. IV, p. 61; Turczan. Cat. Baical. no. 622; Ledeb. Fl. Ross. II, p. 599; Turczan. Fl. Baical.-Dahur. (1846) p. 207, no. 626; Herder, Pl. Radd. (1867) p. 239, no. 130; Крыл. Фл. Алт. III (1904) p. 656.

On saliferous soil on the Abakan Steppe, near Ust Kamuishto; only young specimens were to be found in June.

Distribution: South-eastern Russia and adjacent parts of Asia to Tibet, Cashmere and the Himalayas, southern Siberia, eastwards to the Amoor Province, Mongolia, Manchooria, Corea, China.

Tussilago Farfara L. Spec. Pl. ed. II (1763) p. 1214; Ledeb. Fl. Alt. IV, p. 53; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 421; Ledeb. Fl. Ross. II, p. 470; Herder, Pl. Radd. (1865) p. 374, no. 38; Крыл. Фл. Алт. III (1904) p. 658.

The leaves of this species I have found very frequently about Kushabar and in the Amyl valley, in moist, loamy places.

Distribution: Europe, Caucasia, south-western Asia to Turkestan, the Himalayas and Cashmere, Siberia, northwards to about 66° north lat., eastwards roughly to Lake Baikal, North Africa.

Petasites laevigatus (Willd.) Reichenb. Fl. Germ. Exc. (1830) p. 279. *Tussilago laevigata* Willd. Spec. Pl. III, p. 1969; Ledeb. Fl. Alt. IV, p. 54. *Nardosmia laevigata* (Willd.) DC. Prodrom. V, p. 205; Ledeb. Fl. Ross. II, p. 467; Крыл. Фл. Алт. III (1904) p. 660.

This is a plant of very common occurrence in the territory traversed, where especially to be met with on shallow sands on the banks of rivers, among loose stones and gravel in the river-bed, where it sometimes grows rather far out in the streams, even where they are rather rapid. In such habitats it is a very characteristic plant. I have also collected it in more muddy soil, in stagnant water on islets in the rivers Yenisei and Abakan, and in streams between Minusinsk and Kushabar; very common in the Amyl valley, on the rivers Sisti-kem and Kamsara, and in several places on the Bei-kem. The species flowers at the beginning of June.

Distribution: Bohemia (an escape from cultivation?), north-eastern Russia and Siberia, northwards to about 66½° north lat., eastwards roughly to the Yenisei, northern Mongolia.

Petasites frigidus (L.) Fries, Sum. Veg. Scand. p. 182. *Tussilago frigida* L. Fl. Suec. no. 744; Ledeb. Fl. Alt. IV, p. 54. *Nardosmia frigida* Hook. Fl. Bor. Am. I, p. 307; Turczan. Cat. Baical. no. 578; Ledeb. Fl. Ross. II, p. 467; Turczan. Fl. Baical.-Dahur. (1846) p. 139, no. 566; Herder, Pl. Radd. (1865) p. 371, no. 37; Крыл. Фл. Алт. III (1904) p. 660.

Scattered in subalpine tracts about the Algiac Pass, and on the Upper Sisti-kem, in swampy places. Specimens in my collections, taken about the middle of July, have only leaves.

Distribution: Scandinavia and Finland, arctic islands, northern Russia, Siberia, east-

wards as far as the Tshuktsher Peninsula, Kamtchatka and the Amoor Province, northern Mongolia, North America.

Doronicum altaicum Pallas in Act. Petrop. VI (1779) p. 271; Ledeb. Fl. Alt. IV, p. 113; Крыл. Фл. Алт. III (1904) p. 661. *Aronicum altaicum* (Pallas) DC. Prodrom. VI, p. 320; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 482; Ledeb. Fl. Ross. II, p. 624; Turczan. Fl. Baical.-Dahur (1847) p. 12, no. 636; Herder, Pl. Radd. (1867) p. 425, no. 148. *Arnica altaica* Turczan. Cat. Baical. no. 646.

This pretty alpine plant is rather common in the Altaian, above the tree limit, especially in humid soil, inundated by water from melting glaciers. I have collected it in full flower at the end of July.

Distribution: The Thian-Shan, the Altai and Sayansk regions, eastwards roughly to Lake Baikal.

Ligularia sibirica Cassini in Dict. Sc. Nat. XXVI, p. 401; Ledeb. Fl. Ross. II, p. 460; Turczan. Fl. Baical.-Dahur. (1847) p. 10, no. 634; Herder, Pl. Radd. (1867) p. 426, no. 149; Крыл. Фл. Алт. III (1904) p. 662. *Cineraria sibirica* L., Ledeb. Fl. Alt. IV, p. 102; Turczan. Cat. Baical. no. 643.

In moist, grass-grown places along the banks of the river Sisti-kem. In full flower in July and August.

Distribution: Middle Europe, northern and middle Russia, the Caucasus, the Himalayas, Siberia, eastwards to the Amoor Province and Manchooria, Sakhalin, Japan, China, northern Mongolia.

Cacalia hastata L. Spec. Pl. ed. II (1763) p. 1170; Ledeb. Fl. Alt. IV, p. 52; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 483; Ledeb. Fl. Ross. II, p. 626; Turczan. Fl. Baical.-Dahur. (1847) p. 13, no. 637; Herder, Pl. Radd. (1867) p. 420, no. 140; Крыл. Фл. Алт. III (1904) p. 665. *Ligularia hastata* Less., Turczan. Cat. Baical. no. 645.

Very common in brush-wood on islets in the rivers Yenisei and Abakan, where I have collected flowerless specimens in the month of June. I have also observed this very characteristic plant near Kushabar, with young flower-buds in the middle of July. It is, besides, rather frequent in the Urjankai country: near Ust Algiac, at Ust Sisti-kem, Ust Kamsara, and about Ust Tara-kem, where collected by me in full flower and with ripe fruits in the second half of July and in August. All of the specimens collected have the under sides of the leaves densely hairy, and, accordingly, belong to *f. pubescens* Ledeb. Fl. Ross. II, p. 626.

Distribution: Northern and eastern Russia, Siberia, northwards to 68½° north lat., eastwards to Kamtchatka and the Amoor Province, northern Mongolia, Manchooria, Corea, northern China, northern Japan, Alaska (var.).

Senecio Jacobaea L. Spec. Pl. ed. II (1763) p. 1219; Ledeb. Fl. Alt. IV, p. 110; Ledeb. Fl. Ross. II, p. 634; Крыл. Фл. Алт. III (1904) p. 672. *S. praealtus* in Ledeb. Fl. Ross. II, p. 634.

The specimens collected agree perfectly with European material, save for the outer involucral bracts being more numerous, 5—9, and nearly of the same length as the principal ones, while the typical plant has only 2—3 outer involucral bracts, only one half of the principal ones in length. My material is too scarce to enable me to settle definitely the systematical value of this character. Leaves and young, flowerless specimens of this plant are pretty common in thickets, etc., on islets in the rivers Yenisei and Abakan. Specimens with young flowers have been collected by me near Ust Abakansk in the last days of June.

Distribution: Europe, except the extreme north and south, Caucasia, south-western Asia to Turkestan, Siberia, eastwards to the Amoor Province, northern Mongolia, northern China.

Senecio nemorensis L. Spec. Pl. ed. II (1763) p. 1221; Ledeb. Fl. Ross. II, p. 641; Herder, Pl. Radd. (1867) p. 434, no. 157; Крым. Фл. Алт. III (1904) p. 675. *S. octoglossus* DC. Prodrom. VI, p. 354; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 489; Turczan. Fl. Baical.-Dahur. (1847) p. 19, no. 644. *S. obscurus* Turczan. Cat. Baical. no. 656.

The specimens I have collected of this very polymorphous species, differ in various respects from the typical form, and I enter them as

subspec. **macer** DC. l. c. [Tab. XIV, Fig. 1].

The systematism of the immense genus *Senecio,* perhaps especially within the group of *Sarracenici,* is very troublesome, and the many species, with their numerous varieties and forms, combine the systematic characters in such a way that it is very difficult to decide where a systematically well grounded line between the several types should be drawn.

In point of external habitus, the variety at hand differs by its few, but comparatively large heads, always forming a single corymb, whereby — as regards the structure of the flower cluster — somewhat approaching *S. paluster,* from which, however, it is distinct by its broader leaves, on both sides completely glabrous or nearly so, further, by the straight teeth of the leaves, comparatively smaller heads, a white pappus, and also by fewer and longer outer involucral bracts. In the typical form of *S. nemorensis,* the flower cluster is, on the contrary, compound, the peduncles bearing umbels or new corymbs. The heads are, accordingly, single on the branches of the corymb, comparatively large, erect, but few, only 3—4 or 5 in number. The involucre is campanulate, 6—8 mm. long, of about the same breadth or even broader, while, in the typical plant, the involucre is recorded to be nearly twice as long as broad; my material of comparison of *S. nemorensis α typicus,* however, proves to be somewhat varying as to this character. The principal bracts are 12—15 mm. long, about 1 mm. broad, finely pubescent and ciliate, tapering to a point at the top. Their extreme tips are generally of a light colour, and below this light tip itself frequently furnished with a narrow, darker ring; sometimes, the whole summits of the involucral bracts are of a dark colour. The outer involucre consists of 2—5 very narrow, ciliate, green, linear bracts, pointed at the summit, commonly only 0,5 mm.

broad, equalling or frequentlig exceeding the principal ones. The disc-flowers are yellow, about twice the length of the involucre; the pappus is white, of about the same length as the disc-flowers, or somewhat shorter, but always considerably longer than the involucre. The rays occur to the number of 4—8, of a deep yellow; length of the ligule itself 15—18 mm. The achenes are glabrous. The leaves resemble those in the typical form, perhaps somewhat narrower, completely glabrous or nearly so, only underneath, and especially along the nerves, sometimes slightly and sparingly pubescent. The shape of the leaves is, for the rest, considerably varying in the different specimens, narrower or broader, sometimes very finely denticulate, sometimes more coarsely toothed at the margin. The lower leaves are more or less distinctly petioled, with winged petioles, the upper ones sessile, and mostly narrower than the lower ones. The stem is glabrate and slightly striate.

This variety has been collected by me in several places in the Amyl valley, about Ust Algiac, and at Ust Kamsara, in moist, moss-grown places in the subalpine woods. It, therefore, seemed to be widely distributed in the Sayansk district. It may, likewise, be of a greater systematic value. In full flower, and with partly ripe fruits in the second half of July. Besides this variety, I have collected, on islets in the river Abakan, a form with the under sides of the leaves densely puberulent. Of the latter, however, I have only a single specimen, with young flower-buds, and therefore I dare not identify it with certainty with any of the forms already known. I only purpose hereby to draw attention to this one.

Distribution: The species is distributed in middle and southern Europe, Caucasia, Siberia, northwards to about 69½° north lat., eastwards to the Sea of Okhotsk, Turkestan, the Thian-Shan, northern Mongolia, Manchooria, northern Corea, China, Sakhalin, Japan.

Senecio campestris (Retz.) DC. Prodrom. VI, p. 361; Turczan. Cat. Baical. no. 650; Ledeb. Fl. Ross. II, p. 646; Turczan. Fl. Baical.-Dahur. (1847) p. 23, no. 647; Крыл. Фл. Алт. III (1904) p. 676. *Cineraria capitata* et *crispa* γ *Schkuhrii* in Ledeb. Fl. Alt. IV, p. 104. *C. campestris* Retz. Fl. Scand. Prodrom. I, p. 150; Herder, Pl. Radd. (1867) p. 442, no. 162.

The specimens collected are characteristic in having the basal and lower leaves generally narrowly elliptic, 3—4 cm. long, and 1,5—2 cm. broad, rarely more orbicular or nearly cordiform, and rather distinctly detached from the petiole, which is of about the same length as the blade, or somewhat shorter. The leaves are entire, or slightly serrate at the margin. The stems are comparatively long, 30—40 cm. high, the stem-leaves comparatively few, small, and appressed to the stem. The heads are rather small, 4—12, on an average 6—8 in each plant, on peduncles 1—2,5 cm. long, and of a pale, yellow colour. The whole plant is tattered tomentose and woolly-canescent, especially so the stem and the under sides of the leaves. In a richer material this widely distributed species proves to vary considerably, occurring in a rather great number of distinct local types. Under these circumstances it also seemed difficult to make a nice distinction

between this species and *S. aurantiacus* DC., as the characters which are recorded to separate these 2 species, are very trite and relative, and seemed to pass completely into each other. The deep orange colour recorded to be characteristic of the latter, is of secondary systematic importance, as it is also to be found in authentic forms of *S. campestris* from alpine tracts and arctic regions. It would, probably, in point of classification, be right to maintain the name of *S. integrifolius* (L.) CLAIRV. = *Cineraria integrifolia* (L.) MUR. = *Othomia integrifolia* L., in which are comprised both the species *S. campestris* and *S. aurantiacus*. I have collected this species in dry, sandy meadows on islets in the river Abakan, between Ust Kamuishto and Ust Abakansk, where, in places, it is very common. In full flower in the second half of June.

Distribution: Over the greater part of Europe, Caucasia, Siberia, northwards to towards 71° north lat., eastwards to the Tshuktsher Peninsula and the Amoor Province, northern Mongolia, Manchooria, Corea, northern China, Japan. In North America replaced by the nearly allied *S. tomentosus* MICHX.

Carlina vulgaris L. Spec. Pl. ed. II (1763) p. 1161; Turczan. Cat. Baical. no. 693; Turczan. Fl. Baical.-Dahur. (1847) p. 49, no. 672; Herder, Pl. Radd. (1868) p. 51, no. 192.

var. **nebrodensis** (Gusson) Krylow, l. c. *C. nebrodensis* Gusson, Ledeb. Fl. Alt. IV, p. 13; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 507; Ledeb. Fl. Ross. II, p. 675.

On dry, grass-grown declivities, in thickets of foliage and coniferous trees near Kushabar. Young flowers about the middle of July.

Distribution: Europe, northwards to middle Scandinavia, Caucasia and Asia Minor, southern Siberia, eastwards roughly to Lake Baikal.

Lappa tomentosa Lamarck, Encycl. I (1783) p. 377; Turczan. Cat. Baical. no. 668; Ledeb. Fl. Ross. II, p. 749; Turczan. Fl. Baical.-Dahur. (1847) p. 58, no. 680; Крыл. Фл. Алт. III (1904) p. 685. *Arctium tomentosum* Schkuhr, Ledeb. Fl. Alt. IV, p. 37.

Rather frequent about Minusinsk and Kushabar, and near habitations in the Amyl valley.

Distribution: Nearly all over Europe, except the southern parts, Caucasia, southwestern Asia, Siberia, northwards to about 63° 50′ north lat., and eastwards to the government of Irkutsk, North America (adventive from Europe).

Carduus crispus L. Spec. Pl. ed. II (1763) p. 1150; Ledeb. Fl. Alt. IV, p. 36; Turczan. Cat. Baical. no. 674; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 516; Ledeb. Fl. Ross. II, p. 720; Turczan. Fl. Baical.-Dahur. (1847) p. 51, no. 673; Herder, Pl. Radd. (1870) p. 81, no. 195; Крыл. Фл. Алт. III (1904) p. 687.

Scattered in the tracts along the river Abakan, especially near cultivated places, such as Ust Abakansk and Askys, here and there by the road between Minusinsk and Kushabar, and in dry places at Ust Sisti-kem and Ust Tara-kem. Specimens collected in June have only leaves.

Besides specimens of the typical plant, I have collected, on very dry, sunny declivities, a number of specimens differing in various respects, and which I enter as

var. **monocephalus** nov. var. [Tab. XV].

Ab forma typica differt caulibus humilibus, 10-20, raro ad 30 cm. altis, simplicibus, capitulis singulis erectis. Raro caulis superne ramosus, ramis capitulo solitario terminatis. Capitula majora, 20-25 mm. diametro. Squamae involucri exteriores 12-14 mm. longae, angustissimae, basi 0,5-0,8 mm. latae, superne sensim attenuatae, acuminatae, nervo intermedio plus minus distincto instructae, in spinam contractae, dense appressae numquam patentes vel recurvatae, dense arachnoideae, marginibus scabris. Squamae involucri interiores circ. 3 mm. exteriores superantes, inferne virides, glabrae, superne leviter subrubro-violaceae, basi circ. 1 mm. latae, superne leviter attenuatae, apice haud distincte acuminatae, puberulentae, nervo haud perspicuo instructae. Folia supra sparse arachnoideo-villosa, subfusco viridia, subtus albo-tomentosa.

This subspecies is readily distinguished by having the stems short, mostly simple, bearing a solitary, erect, comparatively large head. The stems, which are generally solitary or a couple together, are short, commonly only 10—20 cm. long, rarely longer, sometimes so short as not to overtop the basal leaves. The stems are only rarely, near the top, furnished with a single, or rarely two short branches, bearing one head each. An unbranched stem seemed to be commonest, and when branched at all, it is always only in the upper part, the branches being always rather short. The stems and branches always terminate in a single head, which is comparatively large, 20—25 mm. in diameter, erect, never nodding. The peduncles are always very short, so that the heads generally do not much overtop the upper stem-leaves. The stem is, throughout its length, densely white-tomentose, winged, and densely prickly. These prickles seemed to form nearly a whorl beneath the heads. Length of the prickles about 1,5 mm. The leaves are rather deeply sinuate-pinnatifid into triangular, toothed segments, the teeth prickle-pointed. The under sides of the leaves are densely white-felted, the upper sides, especially along the nerves, sparingly pubescent, and more or less distinctly arachnoid. The upper sides are generally of a yellowish or brownish tinge, whereby the whole plant assumes a brownish or olive green colour. The involucre is hemisperical, rather densely arachnoid. The outer involucral bracts are 12—14 mm. long, very narrow, only 0,5—0,8 mm. broad near the base, tapering above, and acuminate, with a distinct midrib, prolonged into a short, fine prickle, always densely appressed, never protruding or recurvate. The inner bracts of the involucre are about 3 mm. longer than the outer ones, green below, of a reddish or violet tinge above, about 1 mm. broad below, tapering above, but not acumminate, near the summit finely puberulent, and frequently furnished with a midrib, only, by the way, slightly prominent. The structure of the individual flowers agrees with the typical form, being 14—15 mm. long, with a pappus about 10 mm. long.

This subspecies has been found by me on the Abakan Steppe, near Ust Kamuishto, where occurring on very dry, hot and sunny declivities, among sand and gravel, together with *Leonurus tataricus, Panzeria lanata,* and other xerophilous plants.

As in the steppe plants at large, its flowering season seemed to begin comparatively early, at any rate considerably earlier than in the typical form, having been collected by me in full flower and with ripe fruits in the middle of June.

Distribution: The species is distributed over Europe, except the most southern parts, Caucasia, Siberia, in the Yenisei valley northwards to 63° 25′ north lat., northern Mongolia, Manchooria, Corea, northern China, Japan, North America (adventive from Europe).

Cirsium lanceolatum (L.) Scop. Fl. Carniol. II, p. 130; Ledeb. Fl. Alt. IV, p. 4; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 518; Ledeb. Fl. Ross. II, p. 727; Крыл. Фл. Алт. III (1904) p. 690.

On dry mountain-side, near Kushabar, flowering in the middle of July.

Distribution: Europe, except the extreme north, Caucasia and adjacent parts of south-western Asia to Turkestan, Siberia, eastwards to about the Yenisei.

Cirsium palustre (L.) Scop. Fl. Carniol. II, p. 128; Ledeb. Fl. Alt. IV, p. 6; Ledeb. Fl. Ross. II, p. 733; Крыл. Фл. Алт. III (1904) p. 691.

In moist places on islets in the river Abakan, about Kushabar, near Ust Algiac, and at Ust Sisti-kem. Flowering in July and August.

Distribution: Europe, Caucasia, Siberia, eastwards to about Lake Baikal.

Cirsium serratuloides DC. Prodrom. IV, p. 652; Ledeb. Fl. Alt. IV, p. 7; Turczan. Cat. Baical. no. 669; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 522; Ledeb. Fl. Ross. II, p. 742; Turczan. Fl. Baical.-Dahur. (1847) p. 55, no. 677; Herder, Pl. Radd. (1870) p. 89, no. 202; Крыл. Фл. Алт. III (1904) p. 693.

In thickets at Ust Kamsara; in full flower in the middle of August.

Distribution: Siberia, from about Omsk to Trans Baikal, northwards, in the Yenisei valley, to 60° north lat., northern Mongolia.

Cirsium heterophyllum (L.) All. Fl. Pedem. I, p. 152; Ledeb. Fl. Alt. IV, p. 7; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 523; Ledeb. Fl. Ross. II, p. 739; Turczan. Fl. Baical.-Dahur. (1847) p. 56, no. 679; Herder, Pl. Radd. (1870) p. 87; Крыл. Фл. Алт. III (1904) p. 694. *C. helenioides* Turczan. Cat. Baical. no. 670.

In open, frequently slightly humid thickets, and on the banks of the Sisti-kem, near Ust Algiac. In full flower in the second half of August. The specimens are distinguished by having the stems rather high, with many, comparatively small heads, and also by having the leaves entire or only slightly indented. They therefore seemed to have to be referred to *f. indivisum* DC. Fl. Fr. no. 3086. I have also found the species to be rather frequent about Kushabar, at Ust Sisti-kem, Ust Kamsara, and on flood-plains at Ust Tara-kem.

Distribution: Europe, except the southern parts, Caucasia, south-western Asia to

Russian Turkestan, Siberia, northwards to towards 72° north lat., eastwards roughly to Lake Baikal, northern Mongolia.

Cirsium acaule (L.) All. Fl. Pedem. I, p. 182.

var. **sibiricum** Ledeb. Fl. Ross. II, p. 743; Крым. Фл. Алт. III (1904) p. 696. *C. acaule* Ledeb. Fl. Alt. IV, p. 11; Turczan. Cat. Baical. no. 673; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 521. *C. esculentum* C. A. Meyer, Fl. Prov. Wiatka in Beitr. Pflanzenk. Russ. Reich. p. 43; Herder, Pl. Radd. (1870) p. 90. *C. Gmelini* Turczan. Fl. Baical.-Dahur. (1847) p. 54, no. 676. *C. esculentum* C. A. Meyer var. *sibiricum* C. A. Meyer, De *Circiis* Ruth. in Mem. Acad. Imp. Petersb. Sc. Nat. VI.

This species is pretty frequent at Ust Tara-kem, in wooded steppes and larch forests, and on the steppes on the Ulu-kem, near Cha-kul, where I have collected it with flowers and ripe fruits at the beginning of September.

The Siberian variety of *C. acaule* differs from the European one by having the leaves, especially on the under side, more or less densely hairy, and the margins having only very slight, nearly semiorbicular, angular or toothed lobes. The heads are frequently more than 1, densely congested, the bracts of the involucre nerveless, the pappus equalling or exceeding the corolla. The Siberian variety — as is the case with the European one — also occurs partly with completely sessile heads or nearly so (*f. excapus* Ledeb. l. c.), partly with distinct peduncles to towards a couple of feet high. (*f. Gmelini* (Tausch.) Ledeb. l. c.). The specimens I have collected on the steppes near Cha-kul, have nearly completely sessile heads, or only very short peduncles, 1—1½ inch high.

Distribution: Europe, northwards to middle Sweden and southern Norway, southwards to middle Italy and the Balkan Peninsula, Caucasia, south-western Asia, roughly to Russian Turkestan, southern Siberia, eastwards to Trans Baikal, northern Mongolia. The variety *sibiricum* is to be found in the most eastern area of the species, westwards roughly to eastern Russia and the Caucasus.

Cirsium arvense (L.) Scopoli, Fl. Carniol. II (1772) p. 126; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 519; Ledeb. Fl. Ross. II, p. 734; Herder, Pl. Radd. (1870) p. 82; Крым. Фл. Алт. III (1904) p. 696. *C. setosum* Ledeb. Fl. Alt. IV, p. 10. *C. arguense* DC. Prodrom. VI, p. 644; Turczan. Fl. Baical.-Dahur. (1847) p. 53, no. 674.

Scattered on islets in the river Abakan, on the steppes, near habitations, about Minusinsk and Kushabar, and at Ust Sisti-kem.

Distribution: Europe, except the extreme south-western portions, Caucasia, south-western Asia to Turkestan, Afghanistan and Baloochistan, Pamir, Tibet, the Himalayas, northern India, Siberia, northwards to 66½° north lat., and eastwards through Manchooria, northern Mongolia, China, Japan. Introduced into North America from Europe.

Saussurea pygmaea Spreng. Syst. Veget. III, p. 381; Ledeb. Fl. Alt. IV, p. 14; Turczan. Cat. Baical. no. 675; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 493; Ledeb. Fl. Ross. II, p.

660; Turczan. Fl. Baical.-Dahur. (1847) p. 31, no. 653; Herder, Pl. Radd. (1868) p. 4; Крыл. Фл. Алт. III (1904) p. 700.

In the Altaian, on the Upper Sisti-kem, above the tree limit, in places grown with mosses and lichens. In full flower at the end of August. The specimens belong to *f. typica* Krylow, l. c.

Distribution: Middle Europe, south-western Asia to Turkestan and the Thian-Shan, Pamir, Tibet, in southern Siberia and northern Mongolia, through the Altai and Sayansk regions, to Trans Baikal.

Saussurea crassifolia DC. in Annal. Mus. Hist. Nat. Paris XVI, p. 201; Ledeb. Fl. Ross. II, p. 665; Крыл. Фл. Алт. III (1904) p. 703. *S. salsa* Spreng. Syst. Veget. III, p. 381; Ledeb. Fl. Alt. IV, p. 22, excl. syn. *S. elongata* Karel. et Kiril. Enum. Pl. Fl. Alt. no. 497.

Pretty common on the Abakan Steppe, on the borders of salt marshes, and in saliferous soil near Ust Kamuishto, where accompanying *Lepidium crassifolium, Triglochin maritima, Ranunculus plantaginifolius,* and others. Specimens collected in the second half of June, have only young flower-buds. The specimens collected belong to *f. laciniosa* Krylow, l. c.

Distribution: Eastern Russia, Caucasia, south-western Asia to Turkestan, Pamir, southern Siberia, northern Mongolia, Manchooria.

Saussurea latifolia Ledeb. Fl. Alt. IV, p. 24; Turczan. Cat. Baical. no. 685; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 499; Ledeb. Fl. Ross. II, p. 666; Turczan. Fl. Baical.-Dahur. (1847) p. 37, no. 657; Herder, Pl. Radd. (1868) p. 17, no. 176; Крыл. Фл. Алт. III (1904) p. 704.

In open brush-wood on the Sisti-kem, near Ust Algiac. In full flower at the end of July and the beginning of August.

Distribution: Southern Siberia, eastwards roughly to Lake Baikal.

Saussurea serrata DC. in Annal. Mus. Hist. Nat. Paris XVI, p. 199; Ledeb. Fl. Alt. IV, p. 25; Ledeb. Fl. Ross. II, p. 666; Herder, Pl. Radd. (1868) p. 18, no. 177; Крыл. Фл. Алт. III (1904) p. 705. *S. parviflora* DC., Turczan. Cat. Baical. no. 686; Turczan. Fl. Baical.-Dahur. (1847) p. 37, no. 658.

On humid, grass-grown hills on the river Amyl, between Petropawlowsk and Kalna. With young flowers in the middle of July. In the Urjankai country I have found the species at Ust Sisti-kem, and on flood-plains at Ust Tara-kem.

Distribution: Siebenbürgen, the Ural, Siberia, northwards to past 71° north lat., and eastwards to the Amoor Province, northern Mongolia, Manchooria, Corea, China.

Saussurea alpina (L.) DC. Prodrom. IV, p. 536; Ledeb. Fl. Alt. IV, p. 27; Turczan. Cat. Baical. no. 687; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 500; Ledeb. Fl. Ross. II, p. 669; Turczan. Fl. Baical.-Dahur. (1847) p. 41, no. 661; Herder, Pl. Radd. (1868) p. 36, no. 186; Крыл. Фл. Алт. III (1904) p. 706.

This species is scattered in the subalpine wooded tracts about the Upper Amyl, where I have collected it on the Arradansk heights, about Kalna and the Upper Sistikem. There are to be found here *f. glabra* LEDEB. l. c., and *f. vulgaris* LEDEB. l. c. In full flower in July and the first half of August.

Distribution: Arctic and alpine tracts of Europe, southwards to northern Italy, Novaya Zemlya, Siberia, northwards to Taimur, in latitude 75° 15′ north, and eastwards to the Tshuktsher Peninsula and Kamtchatka, the Altai and Sayansk regions, northern Mongolia, the Thian-Shan, Pamir, North America.

Saussurea discolor DC. in Annal. Mus. Hist. Nat. Paris XVI, p. 199; Ledeb. Fl. Alt. IV, p. 27; Turczan. Cat. Baical. no. 690; Ledeb. Fl. Ross. II, p. 668; Turczan. Fl. Baical.-Dahur. (1847) p. 40, no. 660; Herder, Pl. Radd. (1868) p. 29, no. 182; Крыл. Фл. Алт. III (1904) p. 707.

In dry, sandy woods of larch and pine at Ust Sisti-kem; in full flower about the middle of August.

Distribution: On the mountains of middle and southern Europe, Siberia, Manchooria, northern Mongolia.

Saussurea Frolowii Ledeb. Fl. Alt. IV, p. 15; Крыл. Фл. Алт. III (1904) p. 711. *Haplotaxis Frolowii* (Ledeb.) DC. Prodrom. VI, p. 538; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 506; Ledeb. Fl. Ross. II, p. 672.

Of this species there is only one specimen in my collections, taken in the Altaian, about the tree limit, in slightly open, grass-grown places. The specimen, taken by the end of July, has a single, fully opened head. The leaves are 16—20 cm. long, and the breadth of the large, triangular terminal lobe 5—6 cm; the upper side is completely glabrous, the under side densely arachnoid. Breadth of the solitary, nodding head 3,5 cm. when pressed. The pappus 11 mm. long, the fruit completely glabrous.

Distribution: The species has previously been found in Russian Turkestan and in the government of Tomsk (the Altai region), but does not seem to have been observed heretofore so far east as the Sayansk district (northern Mongolia).

Serratula nitida Fischer ex Spreng. Syst. Veg. III, p. 390.

var. **glauca** (Ledeb.) Trautv. Enum. Pl. Songor. no. 683; Herder, Pl. Radd. (1870) p. 95, no. 210; Крыл. Фл. Алт. III (1904) p. 715. *S. glauca* Ledeb. in Mem. Acad. St. Petersb. V, p. 560; Ledeb. Fl. Alt. IV, p. 38, excl. syn. Gmel.; Turczan. Cat. Baical. no. 662; Ledeb. Fl. Ross. II, p. 758; Turczan. Fl. Baical.-Dahur. (1847) p. 64, no. 686.

Pretty common on the Abakan Steppe, especially on dry, stony declivities or in dry, grass-grown places. I have collected it near Askys, at Ust Kamuishto, and near Ust Abakansk. In full flower in the middle and second half of June. The heads are 2—3 cm. in diameter. Withering remains of the species also occur near Bjelosarsk, on declivities and in steppe meadows at the end of August.

Distribution: South-eastern Russia, Caucasia, south-western Asia to the Thian-Shan, southern Siberia, eastwards roughly to Trans Baikal, northern Mongolia.

Serratula coronata L. Spec. Pl. ed. II (1763) p. 1144, excl. syn. Boccon; Ledeb. Fl. Alt. IV, p. 38; Turczan. Cat. Baical. no. 664; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 528; Ledeb. Fl. Ross. II, p. 756; Turczan. Fl. Baical.-Dahur. (1847) p. 63, no. 684; Herder, Pl. Radd. (1870) p. 93, no. 208; Крыл. Фл. Алт. III (1904) p. 716.

In meadows on the river Abakan, above Ust Abakansk, with young flower-buds in the last days of June. At Ust Sisti-kem, and on dry flood-plains at Ust Tara-kem, with ripe fruits in August.

Distribution: Southern and eastern Russia, Caucasia, south-western Asia to Russian Turkestan, Siberia, northwards to about 61° north lat., eastwards to the Amoor Province, northern Mongolia, Manchooria, Corea, China, Japan.

Leuzea carthamoides DC. Diss. Comp. p. 49, no. 2; Ledeb. Fl. Alt. IV, p. 34; Turczan. Cat. Baical. no. 667; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 526; Ledeb. Fl. Ross. II, p. 753; Turczan. Fl. Baical.-Dahur. (1847) p. 62, no. 683; Herder, Pl. Radd. (1870) p. 92, no. 205; Крыл. Фл. Алт. III (1904) p. 717.

This very characteristic plant, reaching nearly to a man's height, with large heads, 4—4,5 cm. broad, is very common in the tracts about the Upper Sisti-kem, where especially occurring in slightly dry thickets of foliage trees, in grass-grown places. Collected by me in full flower and in part done flowering in the last days of July.

Distribution: Russian Turkestan, the Altai and Sayansk regions, eastwards roughly to Lake Baikal, northern Mongolia.

Centaurea Cyanus L. Spec. Pl. ed. II (1763) p. 1289; Ledeb. Fl. Ross. II, p. 698; Крыл. Фл. Алт. III (1904) p. 722.

Some few specimens of this one I have observed as weeds in fields near the village of Karatus, in full flower about the middle of July. The species is very rare in Siberia, and has hitherto been found only in some few places, especially in the western parts.

Distribution: Nearly throughout Europe, Caucasia and adjacent parts of Asia, north-western India, Siberia, eastwards to Trans Baikal, North America (escaped from gardens, and in ballast).

Gerbera Anandria (L.) Schultz Bip. Flora XXVII (1844) p. 782. *Anandria Bellidiastrum* (L.) DC. Prodrom. VII, p. 40; Turczan. Fl. Baical.-Dahur. (1848) p. 88, no. 688; Herder, Pl. Radd. (1870) p. 96, no. 211; Крыл. Фл. Алт. III (1904) p. 723. *A. dimorpha* Turczan. Cat. Baical. no. 695; Ledeb. Fl. Ross. II, p. 768. *Chaptalia Anandria* Spreng., Ledeb. Fl. Alt. IV, p. 89.

On stony declivities near Mount Uzuik, on the river Abakan. In full flower at the end of June.

Distribution: Southern Siberia, eastwards to the Amoor Province, Manchooria, Corea, southern China, Sakhalin, Japan.

Lampsana communis L. Spec. Pl. ed. II (1763) p. 1141; Ledeb. Fl. Alt. IV, p. 166; Ledeb. Fl. Ross. II, p. 770; Крыл. Фл. Алт. III (1904) p. 725.

Here and there about the Lower Sisti-kem, among dry, stony débris, in thickets, etc. In flower and in part done flowering at the end of July and the beginning of August.

Distribution: Europe, except the most northern parts and the south of the Balkan Peninsula, Caucasia and south-western Asia, Cashmere, southern Siberia, eastwards to towards Lake Baikal, North Africa.

Tragopogon pratensis L. Spec. Pl. ed. II (1763) 1109.

var. **orientalis** (L. spec.) Herder, Pl. Radd. (1870) p. 100, no. 214; Крыл. Фл. Алт. III (1904) p. 729. *T. orientalis* L., Ledeb. Fl., Alt. IV, p. 157; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 537; Ledeb. Fl. Ross. II, p. 786; Turczan. Fl. Baical.-Dahur. (1848) p. 93, no. 691.

Pretty common in somewhat dry meadows on the Abakan Steppe, and in open brush-wood on islets in the river Abakan, about Kushabar, at Ust Algiac, and at Ust Sisti-kem. In flower in June and July, with fruits in August.

This variety is readily distinguished by its large heads of a dark or orange yellow, and by having generally the leaves rolled back into a spiral. There seemed, however, to occur intermediates to the typical plant.

Distribution: The species is distributed over the greater part of Europe, except the extreme north and south, Caucasia, south-western Asia to the Thian-Shan, Tibet, the Himalayas, Pamir, southern Siberia, eastwards towards Lake Baikal, northern Mongolia. The variety *orientalis* is especially to be found in the eastern area of the species, ranging westwards as fas as north-eastern Germany.

Scorzonera austriaca Willd. Spec. Pl. III, p. 1499.

var. **linearifolia** Turczan. Fl. Baical.-Dahur. (1848) p. 95, no. 692; Крыл. Фл. Алт. III (1904) p. 732. *S. graminifolia α angustifolia* Ledeb. Fl. Alt. IV, p. 161. *S. austriaca* Willd., Turczan. Cat. Baical. no. 700; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 541; Ledeb. Fl. Ross. II, p. 792; Herder, Pl. Radd. (1870) p. 100, no. 215.

Pretty common on the steppes about the rivers Yenisei and Abakan, where I have collected specimens in full flower in the month of June. The material of this species brought home, is characteristic in having the stems low, one-flowered, only 4—10 cm. high, thus, as a rule, shorter than the basal leaves, and destitute of stem-leaves, or only with few, short, small, nearly scaly ones. The basal leaves are narrow, 3—6 mm. broad, 1, to 3-nerved, frequently undulate at the margin, or the whole leaf sometimes much twisted into a spiral, now and then conduplicate. This variety is probably indentical with *f. stenophylla* Beck v. Mannagetta, Fl. Nied. Oester. II (1893) p. 1325.

Distribution: Middle and south-eastern Europe, south-western Asia to Russian Tur-

kestan and the Thian-Shan, southern Siberia to the Amoor Province, north-eastern Mongolia, western Manchooria, northern China.

Scorzonera radiata Fischer, Ledeb. Fl. Alt. IV, p. 160; Turczan. Cat. Baical. no. 699; Ledeb. Fl. Ross. II, p. 793; Turczan. Fl. Baical.-Dahur. (1848) p. 96, no. 693; Herder, Pl. Radd. (1870) p. 102, no. 216; Крыл. Фл. Алт. III (1904) p. 733.

This species is nearly allied to the European *S. humilis* L. It has, however, always one-headed stems, bearing only a single (rarely 2), generally very short and narrow, frequently nearly completely reduced, linear stem-leaf, the seat of which is much varying. The height of the stems varies considerably, being generally about twice the length of the basal leaves, 18—25 cm. high; but I have also in my collections fully developed specimens, with very short stems, equalling or even shorter than the basal leaves. The plants vary from being nearly glabrous to more or less densely tomentose. The basal leaves are narrow, generally 4—5 mm., rarely to 7 mm. broad, 10—20 cm. long, flat, with a long and fine point, 1- or 3, rarely 5-nerved. The achenes are glabrous, and furnished with rather deep longitudinal ribs, transversally rugose. I have found this species to be pretty common in dry meadows on the river Abakan and in the Altaian, in subalpine meadows near the tree limit.

Distribution: Siberia, from the Ural to Kamtchatka and the Amoor Province, northern China, Sakhalin.

Hypochaeris maculata L. Spec. Pl. ed. II (1763) p. 1140; Ledeb. Fl. Alt. IV, p. 164; Turczan. Cat. Baical. no. 696; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 536; Крыл. Фл. Алт. III (1904) p. 737. *Achyrophorus maculatus* Scop. Fl. Carn. ed. II (1772) p. 116; Ledeb. Fl. Ross. II, p. 776; Turczan. Fl. Baical.-Dahur. (1848) p. 91, no. 689; Herder, Pl. Radd. (1870) p. 98, no. 212.

Scattered in somewhat dry meadows on islets in the river Abakan, and between Minusinsk and Kushabar, where I have collected it in full flower in the second half of June. The stems are simple, or 2- to 3-branched, the branches generally starting from about the middle of the stem, or only slightly above. The leaves are comparatively narrow, 3—4 cm. broad, and 4—5 times as long, rather distinctly acuminate at the top, sparsely and sharply serrulate at the margin. The species is, besides, rather frequently to be met with in the Urjankai country, in dry meadows, thickets, etc., where I have observed it at Ust Algiac, in several places on the Upper Sisti-kem, at Ust Sisti-kem, Ust Kamsara, and Ust Tara-kem.

Distribution: Europe, except the arctic and southern regions, Caucasia, south-western Asia, southern Siberia, northwards to about 60° north lat., eastwards roughly to Lake Baikal.

Taraxacum Bessarabicum (Horn.) Hand.-Mazzet. Monogr. *Taraxacum* (1907) p. 26. *Leontodon Bessarabicus* Horn. Suppl. Hort. Bot. Hafn. (1819) p. 88. *T. erythrospermum β Bessarabicum* et *intermedium* DC. Prodrom. VII (1838) p. 147. *T. palustre* DC., Karel. et Kiril. Enum. Pl. Fl. Alt. no. 355; Ledeb. Fl. Ross. II, p. 815, p. p.

Very common in saline steppe ground at Ust Kamuishto, in flower and with ripe fruits in the second half of June.

Distribution: From France to the west, through middle Europe, southern Russia, Caucasia, south-western Asia to Tibet, western Siberia.

Taraxacum leucanthum Ledeb. Fl. Ross. II, p. 815; Hand.-Mazzet. Monogr. *Taraxacum* p. 29. *Leontodon leucanthus* Ledeb. Fl. Alt. IV, p. 154; Turczan. Cat. Baical. no. 705. *Taraxacum bicolor* DC. Prodrom. VII, p. 148; Turczan. Fl. Baical.-Dahur. (1848) p. 101, no. 698; Крыл. Фл. Алт. III (1904) p. 739.

Common in saline steppe ground near Ust Kamuishto, together with the preceding one. In flower and fruit formation in the second half of June.

Distribution: From Turkestan, the Himalayas, Tibet, the Altai, southern Siberia, western China.

Taraxacum laevigatum (Willd.) DC. Cat. Hort. Monsp. (1813) p. 149; Hand.-Mazzet. Monogr. *Taraxacum* p. 109. *T. caucasicum γ erythrospermum* Ledeb. Fl. Ross. II, p. 814. *Leontodon laevigatus* Willd. Spec. Pl. p. 1546. *T. erythrospermum* Andrz., Dahlst. in Bot. Not. (1905) p. 152—153. *T. officinale δ caucasicum* Крыл. Фл. Алт. III (1904) p. 741.

Pretty common in grass-grown places on islets in the Yenisei and the Lower Abakan. With flowers and fruits in June. In both localities the specimens collected are not quite typical, but somewhat recall *Taraxacum gotlandicum* Dahlst. in Bot. Not. 1905.

Distribution: Europe, except the extreme north, Asia Minor, south-western Asia and Turkestan, southern Siberia, North America (introduced).

Taraxacum officinale Web. in Wiggers, Prim. Fl. Hols. p. 56; Ledeb. Fl. Ross. II, p. 812; Herder, Pl. Radd. (1870) p. 174, no. 225, p. p. *T. vulgare* Schrank, Bayer. Fl. II, p. 314; Hand.-Mazzet. Monogr. *Taraxacum* p. 88; Крыл. Фл. Алт. III (1904) p. 740, p. p. *Leontodon Taraxacum* L. Spec. Pl. ed. II (1763) p. 1122; Ledeb. Fl. Alt. IV, p. 149; Turczan. Cat. Baical. no. 702. *T. dens leonis* Turczan Fl. Baical.-Dahur. (1848) p. 100, no. 696.

Of this species I have collected a couple of specimens in grass-grown places on an islet in the Yenisei, between Minusinsk and Ust Abakansk. The specimens taken do not agree perfectly with any of the forms of this species described heretofore, one being a form which seemed to be allied to *Taraxacum privum* Dahlst., the other a form allied to *Taraxacum haemalopus* Lindb. Owing to the scarcity of the material, new forms based upon it, cannot be described. In flower and with young fruits at the beginning of June.

Distribution: The species extends over Europe and Asia, except the most northern regions. Gradually strayed nearly all over the globe.

Taraxacum Printzii Dahlst. nov. spec. [Tab. XVI].

Folia pallide viridia, plus minus profunde incisa, lobis patentibus-retroversis, deltoideis vel superioribus saepe falcatis, acutis vel superioribus obtusiusculis, lobo terminali

triangulari — sagittato- hastato, lobulis lateralibus et lobulo apicali saepe angustis; petiolis latis leviter roseo-violaceis. Scapi folia vulgo superantes, leviter coloratis, superne pilosiusculis. Involucrum mediocre pallide, viridi-olivaceum. Squamae exteriores laxe adpressae, infra apicem callosae vel plus minus corniculatae, anguste ovato-lanceolatae — lanceolatae, ad medium squamarum interiorum adtingentes vel paullo longiores, apicem versus vel in tota superiore parte plus minus coloratae; interiores sub apice plus minus corniculatae. Calathium 25–35 mm. diametro. Flores laete lutei, marginales extus stria canoviolacea notatae. Antherae polliniferae. Stylus cum stigmatibus lutescens. Achenium sordide stramineum, superne acute spinulosum, caeterum leviter tuberculatum vel p. m. p. laeve, ca. 2,5 mm. longum in pyramidem 1 mm. longum, angustum, cylindricum subito abiens; rostro 7 mm. longo, pappo albo.

This species, no doubt, belongs to the group of *Dissimilia*, separated by DAHLSTEDT, from which, however, it may be easily distinguished by the paler colour of its leaves, its involucre of a lighter green, with narrower and not scarious-margined outer bracts.

In meadows and grass-grown places on islets in the Lower Abakan, where collected in full flower and with ripe achenes in the early days of June.

Sonchus oleraceus L. Spec. Pl. ed. II (1763) p. 1116 excl. var. γ et δ; Ledeb. Fl. Alt. IV, p. 142; Turczan. Cat. Baical. no. 717; Ledeb. Fl. Ross. II, p. 833; Turczan. Fl. Baical.-Dahur. (1848) p. 115, no. 713; Herder, Pl. Radd. (1870) p. 188, no. 232; Крыл. Фл. Алт. III (1904) p. 745. *S. ciliatus* Karel. et Kiril. Enum. Pl. Fl. Alt. no. 56.

Scattered in and about cultivated fields on the Abakan Steppe, near Askys and at Ust Kamuishto, where I have collected it with quite young heads in June. I have also found it to be pretty common on the borders of fields between Minusinsk and Kushabar; in full flower in July.

Distribution: The species has been carried about with cultivated plants, and is now to be found as a troublesome weed over the temperate and subtropical regions of the old and new world. Thus, it is difficult to ascertain its native country.

Sonchus arvensis L. Spec. Pl. ed. II (1763) p. 1116; Herder, Pl. Radd. (1870) p. 189, no. 233; Крыл. Фл. Алт. III (1904) p. 746. *S. uliginosus* Marsch.-Bieb. Fl. Taur. Cauc. II, p. 238; Ledeb. Fl. Alt. IV, p. 142; Ledeb. Fl. Ross. II, p. 834. *S. maritimus* L., Turczan. Fl. Baical.-Dahur. (1848) p. 117, no. 715.

The Siberian specimens differ from the typical form by being completely glabrous (f. *uliginosus*). As a weed near habitations, such as Askys and Ust Abakansk, and in fields between Minusinsk and Kushabar.

Distribution: A cosmopolite, like the preceding one, its native country being difficult to ascertain.

Mulgedium azureum (Ledeb.) DC. Prodrom. VII, p. 248; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 567; Ledeb. Fl. Ross. II, p. 842; Крыл. Фл. Алт. III (1904) p. 749. *Sonchus azureus* Ledeb. Fl. Alt. IV, p. 138.

In shady thickets of foliage trees at Ust Sisti-kem and near the Kamsara. In full flower at the beginning of August.

Distribution: Russian Turkestan, the Thian-Shan, southern Siberia (Altai and Sayansk regions), northern Mongolia.

Mulgedium sibiricum (L.) Lessing, Synops. Composit. (1832) p. 142; Turczan. Cat. Baical. no. 728; Ledeb. Fl. Ross. II, p. 843; Turczan. Fl. Baical.-Dahur. (1848) p. 124, no. 721; Herder, Pl. Radd. (1870) p. 216, no. 259; Крыл. Фл. Алт. III (1904) p. 750. *Sonchus sibiricus* L., Ledeb. Fl. Alt. IV, p. 140.

On the borders of islets in the Yenisei, in sand, among brush-wood, with young heads at the end of June, and at Ust Algiac, flowering, and partly with ripe achenes about the middle of July. The specimens belong to f. *integrifolium* Ledeb.

Distribution: Northern Europe, Siberia, northwards to about 68½° north lat., eastwards to Kamtchatka and the Amoor Province, Turkestan, northern Mongolia, Manchooria, Sakhalin. The species is also recorded from North America, where, however, it has probably been mistaken for nearly allied species.

Crepis tectorum L. Spec. Pl. ed. II (1763) p. 1135; Ledeb. Fl. Alt. IV, p. 127; Turczan. Cat. Baical. no. 713; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 657; Ledeb. Fl. Ross. II, p. 822; Turczan. Fl. Baical.-Dahur. (1848) p. 108, no. 704; Herder, Pl. Radd. (1870) p. 193, no. 241; Крыл. Фл. Алт. III (1904) p. 754.

Pretty common in dry, sandy meadows on islets in the river Abakan, where collected by me in full flower in the second half of June.

Distribution: Europe, southwards to Spain and northern Italy, Caucasia, southwestern Asia, roughly to Russian Turkestan, Siberia, northwards to about 70° north lat., and eastwards to the Sea of Okhotsk, northern Mongolia, Manchooria.

Crepis praemorsa (L.) Tausch in Flora (1828) Ergänz. Bl. p. 79; Turczan. Cat. Baical. no. 707; Ledeb. Fl. Ross. II, p. 825; Turczan. Fl. Baical.-Dahur. (1848) p. 111, no. 708; Крыл. Фл. Алт. III (1904) p. 756. *Hieracium praemorsum* L. Spec. Pl. ed. II (1763) p. 1126; Ledeb. Fl. Alt. IV, p. 128.

In meadows and in open brush-wood near Ust Abakansk, with young flowers at the beginning of June.

Distribution: Europe, except the extreme north, southwards to northern Italy, Caucasia, Siberia, northwards to past 59° north lat., and eastwards roughly to Lake Baikal.

Crepis chrysantha (Ledeb.) Turczan. Cat. Baical. no. 710; Ledeb. Fl. Ross. II, p. 826; Turczan. Fl. Baical.-Dahur. (1848) p. 112, no. 709; Крыл. Фл. Алт. III (1904) p. 757. *Hieracium chrysanthum* Ledeb. Fl. Alt. IV, p. 129; Bunge, Enum. Alt. p. 80. *Berinia chrysantha* Sz. Bip., Herder, Pl. Radd. (1870) p. 199, no. 246.

The specimens I have collected of this one, have the leaves entire or slightly serrulate, and I therefore refer them to *f. integrifolia* Krylow, Фл. Алт. III (1904) p. 757.

The stems are low, 6—8 cm. long, only slightly overtopping the leaves. Of pretty common occurrence in the Altaian, above the tree limit, growing among lichens and mosses. Flowering and with half ripe achenes at the end of July.

Distribution: Arctic Russia and Siberia, Sayansk mountains, northern Mongolia, Trans Baikal.

Fig. 115. *Crepis chrysantha* (Ledeb.) Turczan. (1/1).

Crepis sibirica L. Spec. Pl. ed. II (1763) p. 1135; Turczan. Cat. Baical. no. 711; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 559; Ledeb. Fl. Ross. II, p. 828; Turczan. Fl. Baical.-Dahur. (1848) p. 113, no. 711; Крыл. Фл. Алт. III (1904) p. 759. *Hieracium sibiricum* L., Ledeb. Fl. Alt. IV, p. 135. *Aracium sibiricum* Sz. Bip., Herder, Pl. Radd. (1870) p. 213, no. 256.

Scattered at Ust Abakansk, in thickets near the river-bank, with flower-buds at the end of June, and on steep hill-sides at Kushabar, in forest of foliferous and coniferous trees.

Distribution: Middle and eastern Europe, Caucasia, south-western Asia to Turkestan, the Himalayas, Cashmere, Siberia, northwards to about 67½° north lat., eastwards to the Amoor Province, northern Mongolia.

Crepis lyrata (L.) Frøl. in DC. Prodrom. VII, p. 170; Turczan. Cat. Baical. no. 716; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 558; Ledeb. Fl. Ross. II, p. 829; Turczan. Fl. Baical.-Dahur. (1848) p. 114, no. 712; Крыл. Фл. Алт. III (1904) p. 760. *Hieracium lyratum* L., Ledeb. Fl. Alt. IV, p. 134. *Aracium lyratum* Herder, Pl. Radd. (1870) p. 214, no. 257.

In open copse wood near Kushabar. In full flower about the middle of July.

Distribution: Southern Siberia, eastwards to Lake Baikal, northern Mongolia.

Crepis tenuifolia Willd. Spec. Pl. III, p. 1606; Turczan. Cat. Baical. no. 715; Крыл. Фл. Алт. III (1904) p. 761. *Prenanthes diversifolia* Ledeb. Fl. Alt. IV, p. 143. *Barkhausia tenuifolia* DC. Prodrom. VII, p. 155; Turczan. Fl. Baical.-Dahur. (1848) p. 105, no. 702. *Youngia diversifolia* Ledeb. Fl. Ross. II, p. 837. *Berinia tenuifolia* Sz. Bip., Herder, Pl. Radd. (1870) p. 197, no. 244. *Crepis baikalensis* Ledeb. Mem. Acad. Sc. St. Petersb. V, p. 559; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 556.

Not unfrequent on the Abakan Steppe, especially on dry, stony declivities near Askys and Ust Kamuishto, where collected in full flower in the middle of June.

Distribution: Southern and eastern Siberia, Turkestan, Pamir, Tibet, Cashmere, northern Mongolia, Manchooria.

Hieracium umbellatum L. Spec. Pl. ed. II (1763) p. 1131; Ledeb. Fl. Alt. IV, p. 137; Turczan. Cat. Baical. no. 726; Karel. et Kiril. Enum. Pl. Fl. Alt. no. 565; Ledeb. Fl. Ross. II, p. 855; Turczan. Fl. Baical.-Dahur. (1848) p. 121, no. 719; Herder, Pl. Radd. (1870) p. 209, no. 254; Крыл. Фл. Алт. III (1904) p. 767.

In thickets, etc., near Ust Algiac, in dry, sandy woods of pine and larch at Ust Sistikem and Ust Kamsara. In full flower in the second half of July.

Distribution: Europe, Caucasia, south-western Asia to Turkestan and the Himalayas, Siberia, northwards to past 68° north lat., eastwards to the Amoor Province, northern Mongolia, Manchooria, China, Japan, Sakhalin, North Africa, North America.

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(Arrangement of the Authors' Names after the Russian Alphabet).

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Corrections and Additions.

P. 16, line 11, for *Molugo* read *Mollugo.*
Fig. 10, for *Orobus* read *Lathyrus.*
P. 20, line 6, for *fluviatile* read *paucistamineum.*
P. 20, line 9, for *thyrsiflora* var. *davurica* read *vulgaris* var. *davurica.*
P. 25, line 1, after *capitata* insert , *Stipa penneta.*
P. 34, line 4, for *Crepi* read *Crepis.*
P 34, line 5, for *Spir, aea* read *Spiraea.*
P. 51, line 35, for *versicolor* read *resupinata.*
P. 52, line 6, for *geniculatus* read *fulvus.*
P. 58, line 7, for *versicolor* read *resupinata.*
P. 74, line 15, for *belidifolia* read *bellidifolia.*
P. 76, line 6, for *decipiens* read *fraudulans.*
Fig. 70 and 71, the clichés have been confounded, the pictures should change places.
P. 110, before first line insert *Gymnospermae* LINDL.
P. 160, line 15, for **decipiens** read **fraudulans.**
Fig. 81, for *decipiens* read *fraudulans.*
P. 190, before first line insert *Dicotyledones* JUSS.
P. 242, line 4, for **Batrachospermum** read **Batrachium.**
P. 408, line 3, for **Dipsaceae** read **Dipsacaceae.**

Explanation of Plates.

(The Figures are in Natural Size).

TAB. I.

Fig. 1. *Cobresia* spec.

Fig. 2. *Scirpus rufus* (HUDS.) SCHRAD. subspec. *exilis* nov. subspec.

TAB. II.

Fig. 1. *Carex atro-fusca* SCHKUHR subspec. *coriophora* (FISCHER) KÜKENTH.

Fig. 2. *Hierochloë odorata* (L.) WAHLENB.

TAB. III.

Fig. 1. *Poa tianschanica* (REGEL) HACKEL.

Fig. 2. *Poa sibirica* ROSCHEWITZ.

Fig. 3, 4. *Salix Turczaninowii* LACKSCHEWITZ. Fig. 3. Specimen with ripe female catkins, seen from below. Fig. 4. Flowering specimen with female catkin.

TAB. IV.

Fig. 1. *Carex fraudulans* nov. spec. Specimen with ripe fruits.

Fig. 2. *Carex displodens* nov. spec., with ripe fruits, the perigynia partly fallen off.

TAB. V.

Fig. 1. *Aconitum ambiguum* REICHENB. subspec. *alpinum* (TURCZAN.) PRINTZ nov. comb.

Fig. 2. *Carex fuliginosa* SCHKUHR subspec. *pronella* nov. subspec.

TAB. VI.

Fig. 1. *Ranunculus subsimilis* nov. spec.

Fig. 2. *Papaver nudicaule* L. subspec. *xanthopetalum* (TRAUTV.) FEDDE.

TAB. VII.

Fig. 1. *Alnus fruticosa* RUPR. subspec. *montana* nov. subspec. Branch with ripe female catkins.

Fig. 2. *Salix myrsinites* L. × *Turczaninowii* LACKSHEWITZ. Branch with a ripe female catkin.

Fig. 3. *Potentilla soongorica* BUNGE var. *glandulosa* nov. var.

TAB. VIII.

Potentilla ternata (MAXIM.) FREYN.

TAB. IX.

Astragalus sulcatus L. subspec. *Turczaninowi* nov. subspec.

TAB. X.

Fig. 1. *Polygala comosum* SCHKUHR f.

Fig. 2. *Veronica pseudolongifolia* nov. spec.

TAB. XI.

Veronica pseudolongifolia nov. spec.

TAB. XII.

Veronica sajanensis nov. spec.

TAB. XIII.

Fig. 1. *Pedicularis uncinata* STEPH. subspec *subalpina* nov. subspec.

Fig. 2. *Oxytropis stenophylla* BUNGE subspec. *caulescens* nov. subspec.

TAB. XIV.

Fig. 1. *Senecio nemorensis* L. subspec. *macer* DC.

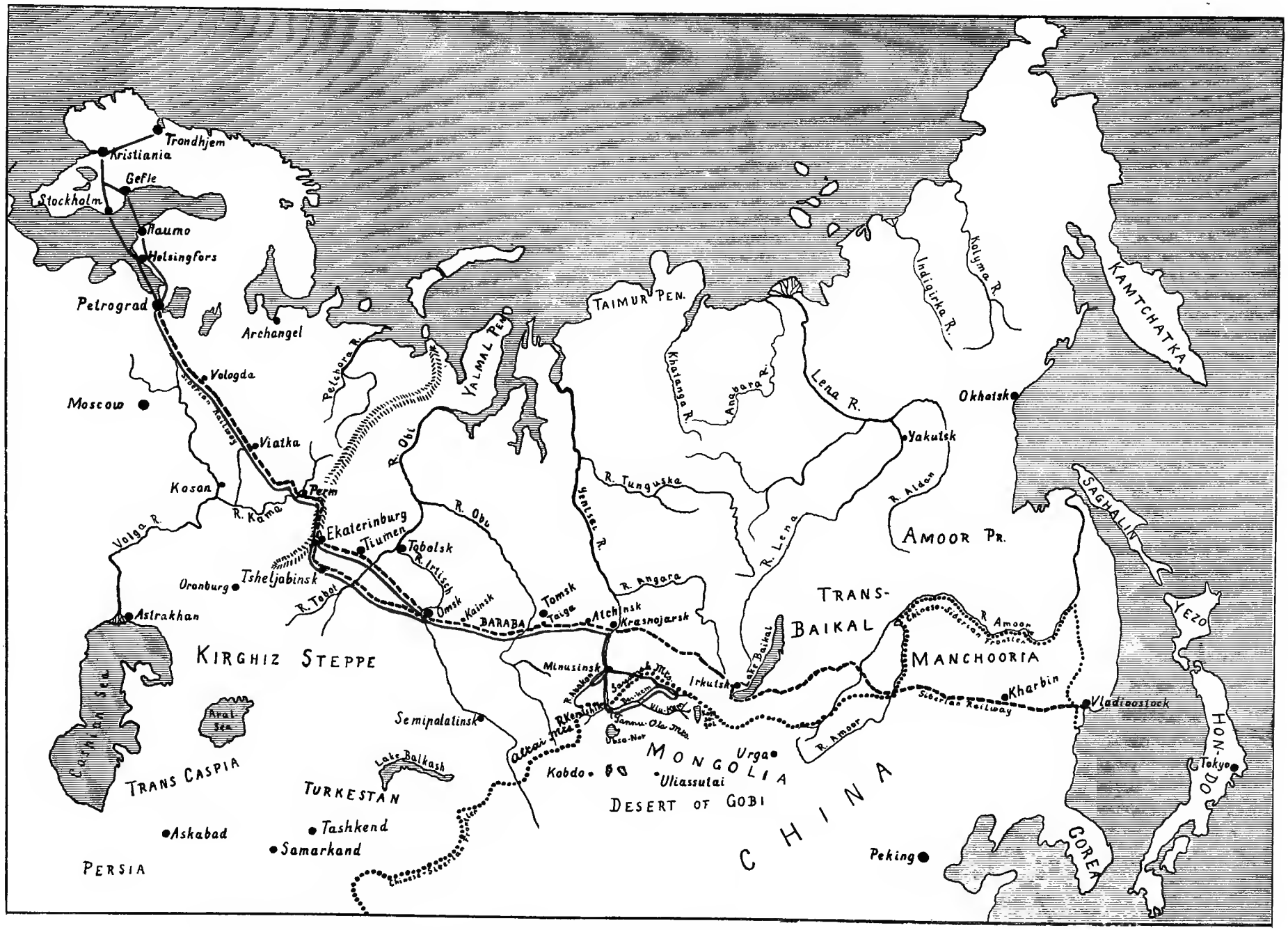
Fig. 2. *Glaux maritima* L. subspec. *pedunculata* nov. subspec.

TAB. XV.

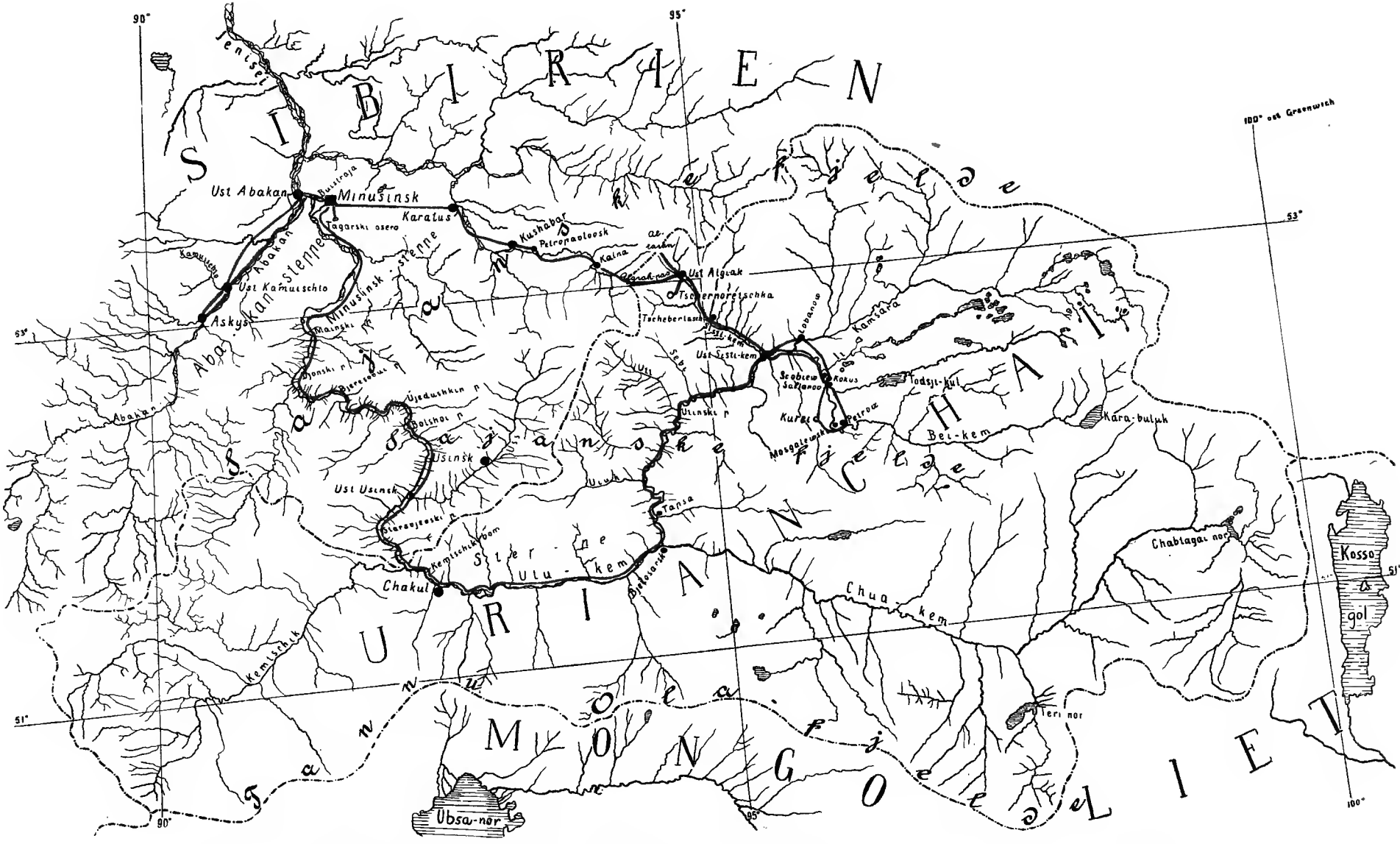
Carduus crispus L. var. *monocephalus* nov. var.

TAB. XVI.

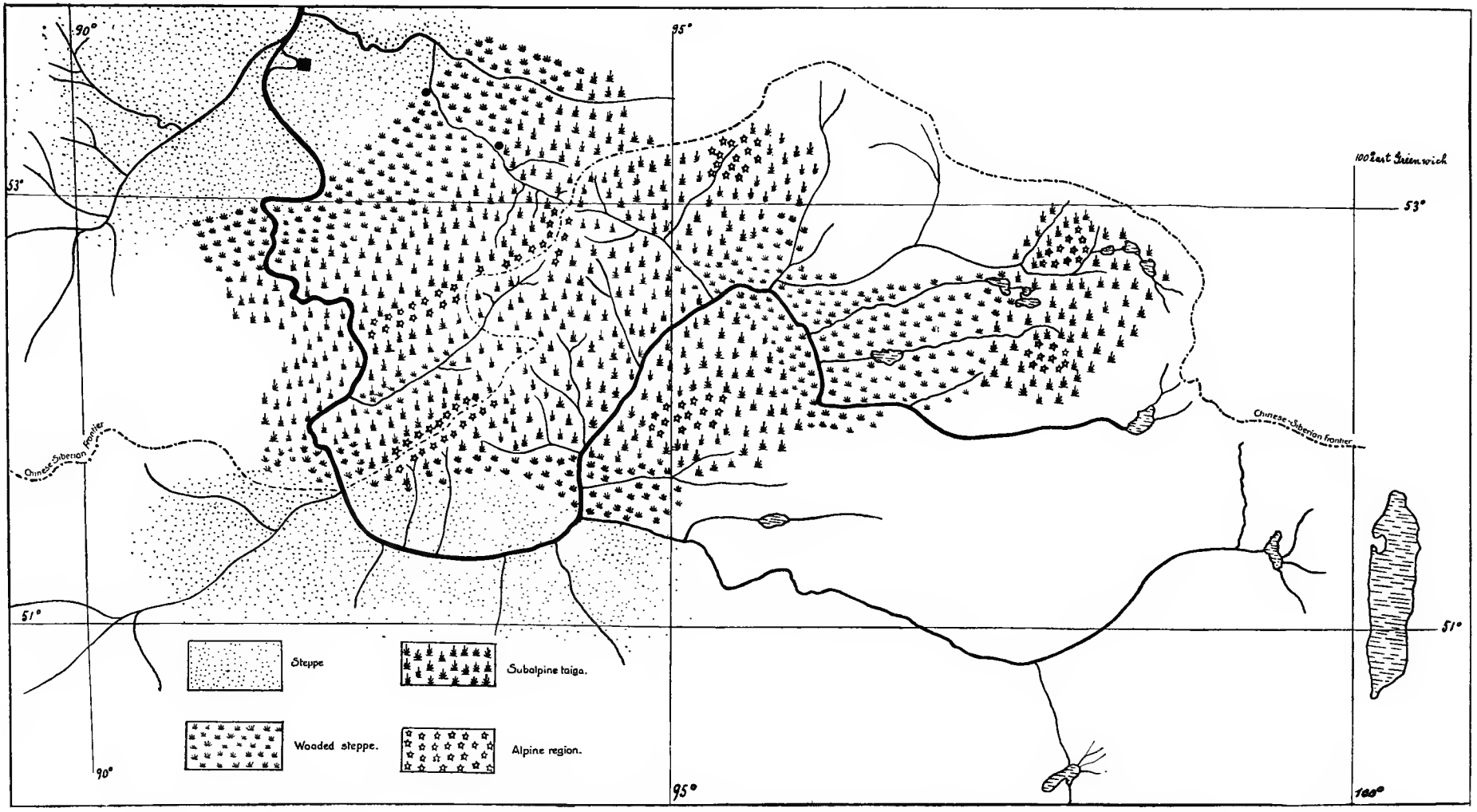
Taraxacum Printzii DAHLST. nov. spec.



Map I. Northern Part of Eurasia, Showing the Travelling Route of the Expedition Marked out by a Red Line.



Map II. Draught of the Urjankai Country (After Rodewitsch). The Red Line Indicates the Route of the Expedition.



Map III. Phytogeographic Map of the Southern Yenisei Valley. The White Areas are as yet Unknown.

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Ljustr. A. B. Lagrelius & Westphal, Stockholm

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Ljustr. A. B. Lagrelius & Westphal. Stockholm